Centenary Volume

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Reminiscences

Pallav 2014-2015

Century old *Sterculia foetida* Linn. in the campus

Alumni Association of Post Graduate
Department of Botany
University of Calcutta

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Editorial

I consider myself very fortunate to be associated with the responsibility of bringing out Vol 8, 2014 of PALLAV, an official organ of the Alumni Association. This volume is going to be published at a memorable time, when the Department of Botany (1913-2013), Calcutta University is proudly getting involved with the yearlong Centenary Celebrations. It is a matter of great privilege that our department, being one of the oldest in this subcontinent is celebrating 100 years of its existence beginning September 2013. We should remember that this is not only an occasion for retrospect, it is not only an attempt to assess and measure its achievements, rather in the enthusiasm generated by the Centenary Celebrations, our effort is likely to be perfectly tuned with our desire to look forward to achieve more in future.

The glorious array of functions of the Centenary Celebrations started with the inaugural ceremony on 13th September 2013 morning, when my glance was amazed with reverence at the sight of so many illustrious stalwarts sitting on the dias. Prof. Anita Mukherjee, the present head of the department said a few words by way of invitation in her address of welcome. Prof. A.K. Sharma, our teacher and President of the reunion committee presented a brief report about the history of hundred-year-old Botany department of the University of Calcutta. Prof. D. J. Chattopadhyay, Pro-Vice Chancellor for Academic Affairs and Prof. Sibaji Raha, Director, Bose Institute, Guests of Honor of the ceremony graced the occasion by their presence. On behalf of the ex-students, Prof. S.K. Chatterjee, one of our senior most alumni reminisced the past and remembered his own student life. The senior and now retired faculty members were felicitated with a 'shawl' gift. After the inaugural session, musical programs performed by singers with distinctive voices could change the entire ambience.

The 68th Annual Reunion of the past and present students was held on the following day, i.e., on 14th September 2013. The present students performed variety program of songs and dances during pre-lunch and post-lunch periods and their skills have earned critical acclaim of the audience. Research scholars participated in the dance drama, 'শাপমোচন' which was highly appreciated by the audience. The drama by the ex-students is an indispensable part of the reunion function. This time the drama 'সাজানো বাগান' written by Manoj Mitra and directed by Dr. Swapan Bhattacharya was staged with grand success. The actors could keep their old theatrical legacy alive with their spellbinding performance.

The alumni association organized a number of events being parts of the celebration. Like previous years, 'বৃক্ষরোপন অনুষ্ঠান' (Tree plantation program) was organized in the Ballygunge Science College campus on September 21, 2013. Prof. A.K. Sharma initiated the ceremony by planting a sapling of *Bauhinia purpurea*. Prof. D. J. Chattopadhyay also planted a sapling of *Magnolia grandiflora*. About 25 saplings of different species were planted in the ceremony. Dr. Asim K. Bhadra, Dr. Animesh Ghorai, Sri Arun K. Dutta, Dr. Bidyut Biswas, Sri Santinath Sarkar and others helped a lot in collecting the saplings.

As a part of Centenary Celebration, the Alumni Association celebrated National Science Day on February 28, 2014. In this occasion, the association invited alumni serving as biology teachers in different schools. Around 75 students with their teachers from 10 schools participated in the event on the theme – "Our Plant: Our Planet". In the inaugural session, Prof. A.K. Sharma, President of the Association, Prof. Anita Mukherjee, Head, Dept. of Botany, C.U. and many alumni members were present. Prof. Kanak Ranjan Samaddar graced the occasion as Chief guest. Prof. Sharma and Prof. Samaddar pointed out many aspects of plant science teaching in school level mentioning many landmark discoveries in Biology. All student participants were awarded certificates and medals. Dr. Ila Chaudhuri, Dr. Debabrata Maity and Dr. Sudipta Roy acted as convenors of the program.

The Alumni Association organized a pleasure trip to Sundarban on 8th and 9th February 2014. The trip was conducted by one of our alumni, Dr. Aditi Paul, owner of the travel agency. Thirty-three alumni members participated in the trip. On 8th Feb, we reached Pakhiralaya resort via Godkhali. On that day, we visited a museum at Sajnekhali. In the evening, Prabir Ganguly, Pranab Bandopadhyay, Susanta Ghosh and a few others entertained the group with songs and recitations. On 9th Feb, we also visited some other tourist spots and came back to Kolkata in the evening.

Alumni Association, Mycological Society and Botanical Society of Bengal jointly organized a picnic-cum-excursion at Nalban, Saltlake City on March 2, 2014. Forty alumni members participated in the picnic. Songs, poems and comic features, entertained the members. Then came the grand feast, which we enjoyed very much. We remain thankful to Prof. Salil K. Chaudhuri, Prof. N. Samajpati, Prof. N.D. Paria and Prof. Subir Bera for their kind efforts in arranging the entire program.

We wish to express our grateful thanks to our Hon'ble Vice-Chancellor Professor Suranjan Das and Calcutta University Press for kindly extending generous support in publishing the present volume.

I express my most sincere thanks and gratitude to the members of the association for their unstinted support and encouragement throughout the year in discharging my duties. My heart is full of sweet memories and satisfaction for the wonderful work done by the members of the EC and reunion committee. I specially acknowledge the help in many ways rendered by Prof. R.K. Chaudhuri and Prof. Rita Kundu in publication of this volume. Best wishes to you all.

Long live our Botany Department.
Long live our Alumni Association.

S. Mukherji

From Secretary's Desk

On 13th September 2013, the Centenary Celebration and the 68th Annual Reunion of the department were held. Our respected teacher Professor Arun Kumar Sharma, President of the Alumni Association of the Department of Botany, inaugurated the function. Professor Sivaji Raha, Director of the Bose Institute, Calcutta, the Honorable Vice Chancellor of our university Professor Suranjan Das, the Hon'ble Pro-Vice Chancellor of our university Professor Dhruba Jyoti Chattopadhyay and Professor Salil Kumar Chatterjee, ex-Director, Medicinal Plants Directorate, Government of West Bengal also graced the occasion.

This function was followed by screening of a video recording of the development of different sections of the department and a cultural function. The next day was the 68th Annual Reunion of the department. Both these functions were memorable. Due to unavoidable circumstances the closing ceremony of the Centenary Celebration could not be held in time and is planned along with 69th Annual Reunion on March 15, 2015.

During this one and half year period the Celebration Committee entrusted Alumni Association to organize a pleasure trip to Sunderbans, Science Day celebration with high school students and tree plantation within the Taraknath Palit Siksha Prangan. The Alumni Association performed these three functions with success. Pictures in following pages illustrate the alumni activities on occasion of the Centenary Celebration of our department. In addition several alumni attended yearly picnic at Salt Lake City.

Another remarkable feature of the Centenary Celebration is that seventeen alumni narrated their reminiscences during their student and professional lives. These are in this Centenary Volume of our association's mouthpiece PALLAV. The University of Calcutta has undertaken the financial responsibility involved in publication of this volume. Professor Subhendu Mukherji, the Honorable editor of Pallav highlighted these reminiscences.

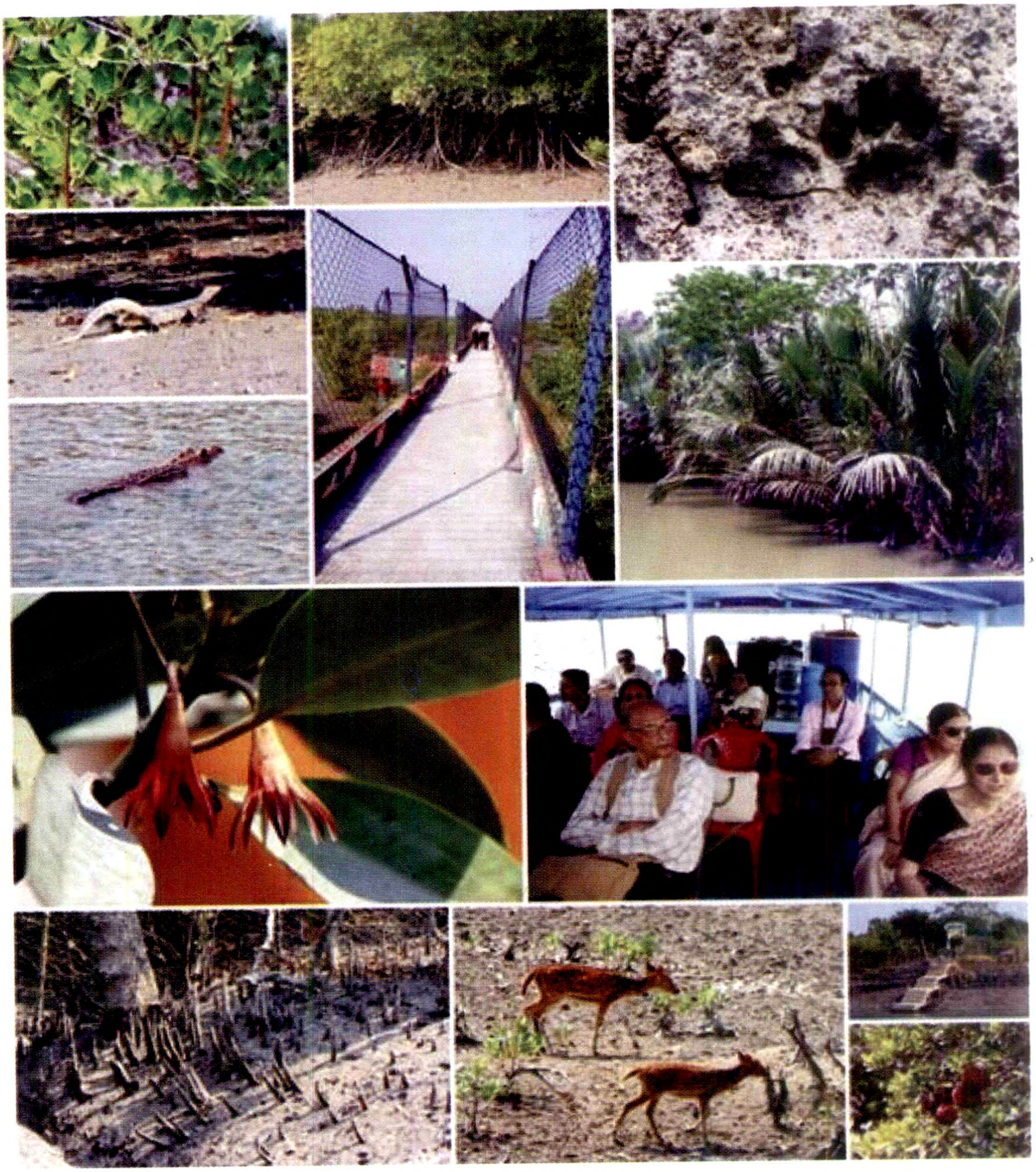
In this occasion alumni association desired that all alumni will extend their hands of co-operation for betterment of the association.

A. K. Biswas

Some Activities of the Alumni Association

Briksharopan

A pleasure trip to Sundarban



Science Day Celebration

Homage to Professor J.C. SenGupta: Personal reminiscences

It was during the years 1946 to 1950 when we were passing through an era of major upheavals in our national history, that we came in contact with Professor J.C. SenGupta, Head of the Department of Botany of the famous Presidency College, Calcutta. It was a memorable period in our student life, when we had the rare opportunity and good fortune of having such an excellent teacher as Prof. SenGupta. He and his colleagues left an indelible impression on us. Despite the unrest and insecurity prevailing at frequent intervals in the city of Calcutta and neighborhood in those days, our teachers didn't fail to communicate to us all the knowledge essential not only for passing our examinations but also for building up a solid basis toward our future activities in the field of biological sciences. Almost all students of our group became college teachers, scientists and research workers in India and abroad, and some of us took up responsible positions in various biological institutions.

In this short article I am going to present to our readers some interesting information on my personal contact with Prof. SenGupta, which have not been recorded anywhere yet.

During the regular lectures and practical courses Prof. SenGupta was always ready to answer all our questions, even if they were not necessarily quite relevant. I remember requesting him to identify a particular wild plant, which I had collected. Although he was not teaching Classification and Nomenclature of higher plants he did not hesitate to give me the proper answer. He gave us a much wider knowledge than what we could ourselves collect from standard textbooks, by mentioning various additional aspects of the theme of the day that he had chosen for a particular lecture. I still remember, how, at the beginning of his lectures on Plant Physiology, he explained to us the classical grouping of this subject (by G. Klebs 1857-1918) under the three major heads: Physiology of metabolism, growth and movement ("Stoffwechsel, Formwechsel and Ortwechsel"). I must confess, that my interest in Plant Physiology was kindled and intensified primarily through his treatment and presentation of this particular branch of Botany.

In spite of his busy schedule he didn't leave the task of training his students to the responsibility of his colleagues alone. He consulted us personally and drew our attention to every detail. When we were engaged in preparing and performing some practical experiment, he helped us to learn at an early stage, that the success of any experiment lies in a critical and intelligent attention to every factor, however insignificant the letter might appear at first. During an exhibition of medicinal and economically valuable plants in our department he was a great source of encouragement to all of us. He was also an active supporter of college sports.

He knew us all by name and took personal interest in our problems. In this connection I like to mention a few occasions, in which I was personally involved. Under the plan of our studies in Botany we had an opportunity to take part in a botanical excursion to Darjeeling, in order to study the subtropical and alpine flora. Unfortunately, I failed to join the group due to illness. After a year, when the next batch of students was going to Darjeeling, I expressed my desire to join the group. Prof. SenGupta agreed to my request immediately, informed the two professors who were going to lead the group that year. However, he made it clear, that, whereas the students of that year would get a part of their expenses from the college fund, I must travel on my own expense. His kindness on my behalf and at the same time his strict adherence to honesty and justice impressed me deeply. Needless to mention, the excursion to Darjeeling was a great success and I could learn a lot, as I had not been to the Himalayas earlier.

Even after I had left the Presidency College, having received the M.Sc. degree of the University of Calcutta, I had opportunities to meet Prof. SenGupta several times. At first he had entrusted me with the preparation of short abstracts of recent original scientific publications in a few established journals. This was not an easy task for me at that stage, but, looking back, I am convinced, that it was very helpful for my future scientific research activities. I am sure, that Prof. SenGupta had selected me amongst his recent students, as he had understood my keen interest in Botany and foreseen my possible role in an academic and research career. Another time he had invited me to cooperate in preparing a popular scientific lecture for the radio programme. I remember well, how he tried to make the subject as informative and popular as possible for the general public. I must confess, that his suggestions and modifications of the text were better than mine, but we were discussing over the points more like friends, than as a teacher and student. Whenever our discussions lasted over the lunchtime, he arranged to get some fresh "dosas" for us from a Madras restaurant. I am delighted to document here from my experience, that he was not only a great scientist, but also a really affectionate personality.

It was through his kindness and support that my desire to go to Germany could be materialized at my very first attempt. In the year 1954, when I was a scholar at the Bose Research Institute in Calcutta, and working for my doctorate under the guidance of Dr. S.K. Roy, my attention was drawn by a friend to the possibility of applying for a two years scholarship to go to Germany for higher studies, under an Indo-German Cooperation Scheme. In order to be selected for an overseas scholarship the candidate had to fulfill four conditions. These were: that the applicant must have excellent academic records, he should not be older than 27 years of age, should preferably have some basic knowledge of the German language, and finally, he must mention the name of some scientist or institution in Germany, where the candidate would like to go for his/her higher training, if selected. Without any hesitation I went to Prof. SenGupta for his advice. At first he wanted to know, if I were really earnest about applying for the scholarship. He mentioned, that he had recommended one of his students to a German professor, but although a positive reply had come, the said student preferred to go to England for personal reasons. Prof. SenGupta was not at all happy about this situation and enquired of me, if I was not going to behave in the same way. I told him frankly, that I would certainly go to Germany, if I got a stipend, but otherwise, it would be not possible for me to go abroad. Thereupon he wrote to Prof. G. Melchers, Director in one of the three Max-Planck-Institutes for Biology in Tubingen. Prof. SenGupta suggested, that I should mention in my application the names of two other scientists, Prof. Buenning (Univ. of Tuebingen) and Prof. Harder (Univ. of Heidelberg), provided Prof. Melchers was not in a position to invite me. In his letter to Germany Prof. SenGupta must have recommended my candidature very strongly and mentioned, that I would like to work in his group for obtaining a doctorate from the University of Tubingen. A reply came from Prof. Melchers very soon with his consent to accept me as a scientific scholar in his institute, provided I would get a scholarship. There was an additional comment to the effect that he cannot prophesize, whether or not I would be able to get a doctorate. Prof. SenGupta congratulated me for the positive reply from Prof. Melchers and added with a smile, that the last comment was a proof of Melchers' frankness and his sense of good humour. He was right. I did receive a hearty welcome in his group and I have never regretted the selection of the Max-Planck-Institute in Germany. I feel proud to express my sincere gratitude to Prof. SenGupta for his help and support, without which my life and career would probably have been quite different. Years later, Prof. Melchers and I paid Prof. SenGupta a short visit, when he was seriously ill, after an operation in a Calcutta hospital. Unfortunately, that was our last meeting.

Finally, I must apologise for writing a lot about myself, but I have decided to do so for two reasons: First of all, I like to take this opportunity for paying homage to my revered teacher, to whom I am really indebted. Secondly, I feel, that the present and future teachers and students of the Presidency College may benefit from my personal experience. I do believe, that every effort is being made to maintain the high standard of teaching and research as well as the great tradition of the Presidency College and of the University of Calcutta, institutions, who had among others such an exceptionally great man like Prof. J.C. SenGupta.

Satyabrata Sarkar
Alumnus (1950)
University of Hohenheim, Stuttgart, Germany

My reminiscence for the period 1958 to 1997

On the fine morning of Monday, September 08, 1958, I first stepped inside the 'Garden House' of Sir Taraknath Palit at 35 Ballygunge Circular Road as a Postgraduate student of the Department of Botany, University of Calcutta. It is about 7 minutes walk from the main bus stop at 'Ballygunge Phari'. The architecturally magnificent building was surrounded by hundred species of trees, shrubs, creepers and climbers. A wide and long water body, on the south side of the building appeared to us an ideal place for studying plant sciences. A majestic *Aegle marmelos* tree, bearing innumerable green tender spherical fruits stood at the main entrance of the premises. It positively added additional impetus and inspirations to the budding botanists.

The plant resources of the Ballygunge Science College garden during that time was a magnum opus of diversity, importance and curiosity and that had been nicely documented by one of the seniormost alumnus Dr. Kalipada Biswas. Within a few days I had fallen in love of two plants- one flowering creeper *Clematis gouriana* (Ranunculaceae) and another *Ravenia spectabilis* (Rutaceae) a shrub. I still fondly grow both these species in my residential garden.

In two years postgraduate classes, we learnt different disciplines of botany from Dr. I. Banerjee (the then HOD), Dr. S. M. Sircar, Dr. S. N. Banerjee, Dr. A. K. Sharma, Dr. J. Sen, Dr. N. K. Chatterjee (during the study leave of Dr. J. Sen) and Dr. S. C. Datta (during Dr. S. M. Sircar's Japan tour). At times, for short periods we had to go to Presidency College for attending theoretical classes of Prof. P. N. Bhaduri, Dr. J. K. Chaudhury, Prof. H. L. Chakraborty, Dr. C.T. Datta and Prof. H. C. Gangulee. Our guest teachers at the Science College were Dr. K. Biswas, Dr. S. K. Mukherjee and Dr. P. C. Datta. In course of a year Dr. I. Banerjee retired on superannuation and Dr. S. M. Sircar became Sir Rashbehari Ghosh Professor of Botany and HOD, which he continued till 1967 when he was nominated and appointed the Director, Bose Institute.

At that time, thesis paper in lieu of special paper with 200 marks was allotted to a limited number of students. I got the opportunity to take thesis paper in Plant Physiology, under Dr. S. M. Sircar who was recognized as the 'Rice Physiologist'. While discussing the topic of dissertation Dr. Sircar told us that he had brought samples of gibberellic acid (GA) from Japan. GA was a newly isolated plant growth regulator from the fungus *Gibberella fujikuroi* that causes 'Bakane Disease' of rice plants in Japan- resulting in hyper-elongation of plant without tillers and onset of flowering. He asked budding plant physiologists, who approached him for thesis paper, what plant material one would like to select to test the efficacy of GA? Most of us replied, 'Sir, rice"; I simply replied "Sir jute (*Corchorus sp.*)" because hyper elongation of jute plant would give more fiber and would be economically beneficial. Thus, I started my researches on the effect of GA on jute plant. Still now, I feel proud to be one of the pioneering workers on 'gibberellic acid and fiber crops'; followed by C. K. Atal (*Crotolaria*) and R. K. Mukherjee (*Corchorus*) in India, Fausto Lona (*Crotolaria*) at Milan, Italy and Margaret Stant (*Corchorus*) in Jordell Laboratory, Kew, England. A research paper was published, jointly with Dr. S. M. Sircar before my M.Sc. exam. The reprint was incorporated in the thesis. Prof. U. N. Chatterjee (University of Gorakhpur) who came for my viva-voce examination was very pleased and happily credited extra marks to me.

We had local excursions in Botanic Garden, Thakurpukur, Sakherbazar, Barrackpore, Chinsurah etc., and a nine days (April 17 – 25, 1960) plant collection tour to Darjeeling and Kalimpong under the supervision of Dr. J. Sen. During that tour we met the Japanese Eastern Himalayan expedition team and the team leader the reputed plant explorer Dr. Hiroshi Harrar. We also visited the famous Virus Research Institute at Kalimpong and gathered much knowledge on 'chirke and furke' disease of cardamom spice. Incidentally, at the last part of the excursion Dr. Sen fell very sick with hill diarrhoea. My classmates entrusted me to escort Dr. Sen safely from Bagdogra to Dum Dum (Calcutta) by air.

I am proud to mention here that M.Sc. (Botany) students of 1958–1960 session were so long the best batch of students securing highest number (12) first class with 100 per cent success in the examination, a record indeed ever since the inception of the Department of Botany, University of Calcutta in 1914. During the time Dr. I. Banerjee retired and Dr. S. M. Sircar was selected and appointed Sir Rashbehari Ghosh Professor of Botany and HOD.

We enjoyed our two years postgraduate studies happily and merrily keeping very cordial relations with our reverend teachers and other staff members of the department including Mali's like Dhai, Dhari, Kesto and Benu who looked after our experimental plants in the garden, and also research workers. The reunion(s) of the department were the most eventful during our student life. In both the years I was one of the General Secretaries. A nice 'Reunion Souvenir' was published under the supervision of Dr. S. N. Banerjee.

During that time a dozen of Research Fellows and Research Scholars were attached to the Botany Department. Of them I must, with gratitude, mention the name of Dr. (Sm.) Archana Sharma, 'Archanadi' to all of us who not only was very cordial to the students but also kept full information about their activities in college campus and acted as their guardian. It still flashes my mind that, Cytology section had arranged a picnic at the Indian Botanic Garden on December 10, 1960 for the occasion of conferring a D.Sc. degree to Archanadi in addition to her Ph.D. degree by the Calcutta University. I was invited by Archanadi to join the picnic.

After successfully completing my M. Sc. I remained attached to the department (April 03, 1961–December 03, 1970), engaged in researches on hormonal regulation of plant growth and development, especially by GA and of course on jute plant. Within a year or so I was appointed Research Assistant to the Ghosh Professor of Botany, a permanent position at the University of Calcutta. In that capacity, I had to assist Prof. Sircar in administrative and research works of the Plant Physiology laboratory. Also I was entrusted to take the practical classes (both general and special papers) of postgraduate students. I was entrusted to train a German student, Hermann Hanke who came to our department for practical research training for about six months.

Prof. Sircar became the President of Botany Section of the Indian Science Congress Association session in 1964. The most remarkable event during this period, 'International Symposium on Plant Growth Substances', first of its kind in this Department, was organized (January 23 to 28, 1967). Prof. P. Parija (Cuttack University, Orisha), the then doyen of most elderly Plant Physiologist inaugurated the symposium. Apart from scientists of Indian Universities and Institutions eminent foreign delegates like Dr. van J. Overbeek (USA), Dr. M. Kh. Chailakhyan (USSR), Dr. G. Melchers (Germany), Dr. Lawrence Rappaport (USA), Dr. M. B. Wilkins (UK) etc. attended and presented papers in the symposium. My role in the symposium was narrated by Prof. S. M. Sircar in the 'Proceedings of the International Symposium on Plant Growth Substances'. Let me narrate an incident during symposium-tour to Sundarbans (January 26, 1967), by West Bengal Forest Department's launch

'*Banarani* '. While boarding the launch Dr. Rappaport slipped and fell on muddy shore. His costly American cigarette packet fell in the river. He was really very upset by thinking how to survive long hours without smoking. Dr. D. P. Bhattacharyya ('Durgada') came to rescue with a packet of '*Charminar*', Dr. Rappaport was so impressed by that brand that he collected several cartoons before he left for USA by saying that Rajamundry tobacco was much better than Maryland (USA) tobacco.

Shortly after this symposium Prof. Sircar joined the Bose Institute as the Director on September 30, 1967. Dr. S. N. Banerjee became the HOD. From 1968–1970 sessions Morning Shift for M.Sc. started. Dr. A. K. Sharma became the Professor of Botany. Then he took over the charge of the Department from August 02, 1969. Prof. Sharma by an official order instructed me to take plant physiology theory classes on plant growth regulators.

In the mean time, our teacher Dr. J. Sen was invited by the Govt. of West Bengal to take the charge of the then Royal Botanic Garden as Superintendent. He succeeded Dr. D. Chatterjee (well recognized for his contributions on endemism and phyto-geography researches) who was assassinated inside the garden on September 24, 1960. On and from January 01, 1963 the Royal Botanic Garden was transferred to the Botanical Survey of India, Govt. of India and renamed as Indian Botanic Garden. Dr. J. Sen became the first Deputy Director and Head of the garden. I succeeded Dr. Sen as Head of the Indian Botanic Garden in 1982.

In response to an UPSC advertisement for Plant Physiologist (Sr. Class I position) of Botanical Survey of India, I applied for the post, and was unexpectedly selected. I had a mixed feeling and hesitation to leave this beloved working place where I was always under the cool canopy of my respected teachers, Prof. Sircar and Prof. Sharma in particular. However I received full inspirations and impetus from my beloved parents and Prof. Sharma who assured me by saying "Rothin, you join BSI, it is fairly a high Govt. of India service, you will get many benefits and opportunities and I am confident that you will be able to manage all situations. The door of the University will remain open for you for one year, if you desire to return here." With full blessings of Prof. Sharma, Amiya Babu (Sri A. K. Ghosh) and Archanadi I left the Department of Botany, University of Calcutta on December 03, 1970. On and from the forenoon of December 04, 1970, I became an officer of the Govt. of India.

I was in-charge of the Plant Physiology and Biochemistry Section of the Central Botanical Laboratory (CBL), BSI, in the Indian Botanic Garden. The section's main concern was some medicinal and aromatic plants such as *Catharanthus roseus*, *Solanum khasianum*, *Dioscorea* sp., *Rauvolfia serpentine*, *Costus speciosus*, *Ocimum kilimandescharicum* etc. Prof. Ashima Chatterjee recognized the importance of *Catharanthus roseus* as potent source of several oncolytic alkaloids. Experiments on these plants yielded Ph.D. theses to my students. The Silver Jubilee of the CBL (established in 1955 by Dr. E. K. Janaki Ammal) was also celebrated during my nearly 10 years tenure in this establishment.

From July 31, 1980 I took over the charge of the Central Circle, BSI at Allahabad as Deputy Director, and took active part in renovation of the experimental garden there and introduced new varieties of reses. That rosary was well appreciated by Dr. S.Z. Quassim, Dr. M.G.K. Menon, Dr. Manju Sharma and many others. My tenure at Allahabad was very short.

On April 1, 1982 I took over the charge of the Indian Botanic Garden and became a humble successor of Sir William Roxburgh, Sir Nathaniel Wallich, Sir George King, Sir David Prain, Mr. C. C. Calder (who was also responsible for initiation of postgraduate classes in botany, CU at the request of Sir Asutosh Mookherjee), Dr. K. Biswas, Dr. D. Chatterjee, Dr. J. Sen. As per instructions of the Ministry of Environment and Forests (MoEF), Govt. of India I remained as Head of the Indian Botanic Garden as Deputy Director, Joint Director and also as Additional Director till my retirement on superannuation on October 31, 1997, perhaps the longest duration for an Indian scientist in this prestigious Botanic Garden in South East Asia. During this long period of over 17 years much stress were given to the *ex-situ* conservation of rare, endangered, threatened and endemic plants of India, completion of books (as per recommendation of IUCN) entitled 'A Directory of Botanic Gardens and Parks in India' and ' Directory of Plants in the Botanic Gardens in India'. Keeping the suggestion of the then Hon'ble Governor of West Bengal a book on 'Beautiful Trees and Shrubs of Calcutta' was published. The Bicentenary of the Indian Botanic Garden (1787–1987) and the Centenary of the Botanical Survey of India (1891–1991) were celebrated during my service. The following developmental works of the Garden were undertaken and completed: These are, establishment of a medicinal plants garden ('Charaka.Udyan'); construction of a glass conservatory for growing cacti and succulents; construction of

Bicentenary Gate and exhibition arena on Andul Road; release of the book on 'A Manual of Cultivated Palms in India'; arranging annual flower show at the Garden since 1984 etc.

I published over 250 research papers and popular articles in (including in Bengali and Hindi) and six books (five published by Botanical Survey of India and one by the Raj Bhawan, Govt. of West Bengal). I visited countries like China, Japan, Hongkong, Brazil, USA, UK, Bangladesh, Sweden, Finland and Arctic Circle. Lastly I end my sweet reminiscences with few lines from Rabindranath Togore's song:

পুরানো সেই দিনের কথা
ভুলবি কি রে হায়।
ও সেই চোখের দেখা, প্রাণের কথা,
সে কি ভোলা যায়।

Rothin Kumar Chakraverty (1960)

An experience worth reminiscing

I consider myself lucky and privileged to get the rare experience of being associated as a founder teacher of P.G. Department of Botany of Burdwan University (B.U.).

After passing out from Presidency College, Calcutta with Botany Honours, I got admission in P.G. Department of Botany, Calcutta University in 1958. We were 15 students apart from 10 students enrolled in P.G. Department of Presidency College. Theoretical classes of all 25 students were held in the department except one day every week when Prof. P.N. Bhaduri used to take classes in genetics and plant breeding at the Presidency centre. Practical classes of the students were held in their respective centres.

Calcutta Phase

Botany department was situated in the old building of Sir Tarak Nath Palit with a surrounding big garden full of fruit trees and flowering plants and a fairly large lake behind, a really peaceful and serene environment ideal for botanical studies. I got the privilege to study under a number of famous and illustrious teachers of Calcutta such as Dr. I. Banerjee (HOD) who taught us anatomy, embryology and taxonomy. In the practical class he allowed us to draw figures of embryology with Indian ink under his direct guidance. Dr. S.N. Banerjee taught us mycology and plant pathology and I enjoyed his lucid lectures supported by beautiful drawings on the black board. Dr. A.K. Sharma taught us cytogenetics and bryology. I used to be spell bound and listened his lectures with rapt attention. The short summary, which he dictated after every lecture, was very helpful to prepare our notes. Dr. N.K. Chatterjee (in absence of Dr. J. Sen who was then abroad) taught us gymnosperms. Later, Dr. Sen taught us the subject. The lectures were followed by comprehensive notes on the subject. Dr. S.C. Dutta (in absence of Dr. S.M. Sircar who was then abroad) taught us plant physiology initially. Later, Dr. Sircar taught us the subject. However, classes in algology supposed to be taken by Dr. K.P. Biswas were irregular and quite neglected. After completion of one year, the students were to select one specialization during the next year. We were allowed to take up either a special paper (theory and practical) or workout a research project and submit a dissertation on a particular topic in the subject of our choice. I wanted to study mycology and plant pathology as my specialization under Dr. S.N. Banerjee and my topic of research was "Bamboo-rot by *Flammula dilepis*" I had to study biology of the fungus including cultural studies microstructural and microchemical studies of the bamboo and morphogenesis of the basidiocarp. The work was later published in international journals (Osterr. Bot. Zeitschrift 1966; Science & Culture 1962 and Indian J. mycol. Res. 1967).

After passing M.Sc. in 1960, I got a scholarship of CSIR (Man Power) under Dr. S.N. Banerjee. It was decided that I work on decay of economic timber, *Shorea robusta* by *Lentinus praerigidus* and *L. subnudus*, and two common destructive wood rotting fungi in West Bengal. At that time, Dr. Anjali Roy working as post-doctoral fellow. Miss Himani Devi writing up her Ph.D. thesis and Mr. Kanak R. Samaddar also working for his Ph.D. in the laboratory. All the seniors helped me a lot at the initial stage of my research. In addition to my own research, I was given the responsibility to maintain the fungal stock cultures (more than 150 species) essential for both UG practical classes (in affiliated colleges) and PG practical classes. Besides, I had the privilege to assist my teacher to arrange and conduct PG practical classes, which proved to be very helpful in future as a teacher of Burdwan University. Major part of my Ph.D. work included the detailed study on the biology of *Leutinus* spp., the nutritional as well as environmental requirements in culture for optimum growth, decay in the laboratory on wood under different environmental conditions to study the extent of decay on the basis of changes in texture, strength and colour, microstructural and micro chemical changes in decayed wood and preservative treated wood exposed to the fungus to study enhanced resistance. The thesis also included a section on the cytological studies of four species of wood rot fungi *Flammula dilepis, Polyporns agariceous, P. sangnineus* and *Fomes lividus*, which were later, published (Caryologia 1962, 1966, Indian J. mycol. Res. 1967, 1968).

Burdwan Phase

I joined B.U. on September 14, 1964 (now considered the starting date of the department) and met the then Vice Chancellor Mr. B.K. Guha, an ICS. I was overwhelmed with his simplicity, kindness and soft manners unlike other ICS Officers. From him, I came to know that the department would start with two lecturers, my self and Mr. Pranjit Sharma and Professor designate P.N. Bhaduri (then Head of the department, Presidency College, Calcutta).

Just a week before puja vacation our classes started. On the first day, V.C. accompanied by the administrative officers took us (two lecturers) to the class and introduced us to the first batch of 15 students. The rest of the week was shared by myself (mycology/bryology), P. Sharma (algology/taxonomy of angiosperm) and one day by Dr. S. Mukherjee (pteridology & gymnosperms).

Prof. Bhaduri, due to precommitments could not join before middle of January 1965. However, after the puja vacation he started to attend Burdwan University once a week, to take classes (cytogenetics/anatomy) as also to guide us about what would be necessary for infrastructure development. During this period it was also my duty to act as liaison between Prof. Bhaduri and the university. We prepared detailed lists of all requirements. I used to take the lists to Burdwan and with Mr. Sharma to place urgent order. In 1965, Prof. Bhaduri joined as head and the department started at a tremendous speed. With him came his entire research unit comprising dozens of research personnel staff and instruments.

In 1970, I got promoted to the post of Reader and the centre became famous for developing new rice varieties and also as a multiplication centre for good quality of rice seeds for distribution among the local farmers.

Initially four special papers viz., Cytogenetics, Plant Physiology, Mycology and Plant Pathology and Algology were offered to the first batch of students. Subsequently, Microbiology, Paleobotany, Taxonomy of Angiosperms and Genetics and Plant Breeding were added. To give emphasis on emerging subjects like Ecology.

During the first couple of years, I became fully involved in preparing my teaching materials as I considered it my first priority. Moreover, from empty rooms, I had to develop my Mycology and Plant Pathology laboratories at least with the basic infrastructural requirements before starting research. From 1968, I started to take research scholar almost regularly every year. Initially one student worked on fungi causing tree diseases and loss of economic timbers but later my research shifted to other areas of plant diseases and their control.

Research in Burdwan started with the joining of the first scholar in 1969 that worked on *Fomes durissimus* attacking economic trees viz., *Swietenia mahagoni, Casuarina equisetifolia* and *Mimusops elangi.* Microstructural and microchemical studies of wood

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decay (Trans. Brit. Mycol. Soc. 1975, Eur. J. Forest Path, 1976). Strain variations of the fungus (Acta Soc. Bot. Palaniae, 1976), histopathology and histochemical studies (Phytopath Z. 1975), decomposition of lignin and cellulose (Holzforschung, 1975; Wood & Fibre, 1976) were worked out. Another student worked on different aspects of malformation of mango inflorescence by *Fusarium moniliformae* (Mycologia 1981). Biochemical changes in the malformed tissue e.g., nucleic acid content (Phytopath. Z. 1977) nitrogen content (Gionate Botanico Italiano, 1978), lignin and cellulose (Acta Phytopath Acad. Scien. Tiarum Hungaricae, 1977) and control of the disease (Indian Agric. 1977) were studied. Another student worked on different aspects of banana fruit rot in storage by *Botrydiploidia theobromae* (Indian J. Horticulture 1981; Acta Agrobotanica, 1978).

Sweden Phase

In 1974, I got a research fellowship initially for 2 years from SIDA (Swedish International Development Agency) to work under Prof. Nils Fries at the Institute of Physiological Botany of Uppsala University. My university was kind enough to grant me study leave and I along with my family (wife and son) left for Sweden. When we reached Arlanda airport at about midnight, where the outside temperature was -20°Celsius. Even at that dead of night, for the first time I saw Prof. Nils Fries, a tall, slim, bespectacled, man of about 64 of age waiting for us. He was Director of the institute. He drove us to Uppsala in his car. The entire journey on snowy roads through forest was a breathtaking sight.

Uppsala University was one of the five oldest universities of the world and established in 1476. From 1628-1851 Botany along with Medicine was part of a professorship and Carl von Linn'e was one of the holders. It was held by Elias Melin, succeeded by Nils Fries (1956-78).

Uppsala is a university township – mostly with cosmopolitan student population. The institute was a 10-minute walk from the apartment. The institute was a fairly large having 5 storied building with two basements. Prof. Fries introduced me to different laboratories and staff of the institute, namely – Dr. Lisbeth Fries (wife of Prof. Nile Fries); Dr. Elizabeth Henriksson; Dr. Torne Unestam; Dr. Tage Eriksson; (My wife Shakuntala got an opportunity to work with Dr. Eriksson); Dr. Angelica V. Hofsten; Dr. Sven Heliquest; and Prof. Nils Fries.

My research work was on seed deterioration during storage and preservation by using volatile and antifungal compounds of plant origin. Prof. Fries allowed me to draw detailed plan of work after reviewing the relevant research being done elsewhere in the world. After a few days, I could realize that with so many resources easily available and handy research became not only attractive and easy but also fairly fast. The institute store was very rich and anyone who wanted a rare chemical or reagent not available in the store, the in-charge would help to procure it for him.

By 1976, I had made satisfactory progress with two papers already published (one in Z. Pflazenkran und Pflazenschutz, Germany and one in Cereal Chemistry, USA), one accepted (Acta Agric, Scandinavicae, Sweden), one communicated and work on two more were in progress. Prof. Fries one day informed me that Uppsala University would be celebrating 500th year in late 1976 and there would be a special convocation for those receiving doctorate degree. He wanted me to submit a thesis for award of Ph.D. on the basis of the work already published including the work in progress. A part of my work was carried out in the animal nutrition laboratory at the Uppsala Agricultural University, Ultuna where piglets were fed on volatile treated maize to measure the effect on animal health. Immediately, I got engaged to compile the entire research done in Uppsala into a thesis. It was customary that the university would make 400 copies of the submitted manuscript by photo offset print, keep 300 copies for exchange with other world universities and give 100 copies to the candidate for distribution on the day of the open viva voce examination.

Prof. Fries acted as chairman with three external examiners Prof. Sigvard Thomke (Faculty of Animal Nutrition, Uppsala Agricultural University, Ultuna), Prof. Borea Noren (Head, Department of Microbiology, Stockholm), Prof. Helmut Kolk (Director, Seed Station, Solna) who acted as faculty opponents. Faculty opponents were to criticize all aspects of the work in a negative manner and the candidate had to defend the work giving reasons and purpose. Any one of the audiences could also put up queries, which had to be attended. At the end, however, only the chairman and the faculty opponents jointly approved and recommended award. Attending the convocation of the 500th year of Uppsala University to receive my second Ph.D. degree was indeed a very special event in my life. The University hosted a banquet of more than 800 people (honourable members, teachers, awardees & their spouces) at the Uppsala castle at night.

Final Burdwan Phase

After returning to Burdwan at the end of 1977, I became engaged once again in PG teaching, guiding research of Ph.D. students and a lot of administrative work. In 1978, I got the post of Professor of Botany, which I held till my retirement. I acted as head of the department between 1981 and 1983. I applied and got grants from various sponsors viz., UGC, CSIR, ICAR, Adaptive Research Council (W.B.) and SIDA (a collaborative project jointly with Prof. Nils Fries). A total of 24 researchers were awarded Ph.D. by B.U. under my supervision and 178 research publications (80 in foreign journal) were made in international journals. The diverse line of my research included:

i) Decay of economic timbers by wood rotting fungi and their control (Holzforschung 1993).

ii) Biodegradation of agroindustrial wastes and role of deteriorated products on soil fertility (International Biodegrad. Dutt. 1981; Pl. Soil 1979).

iii) Deterioration of seeds by fungi in storage and seed preservation by antifungal volatile compounds (studies were done on starchy grains (Phytopath. Z. 1978; Cereal Chem. 1978; Z. Pflazenkr. Pflanzenchutz 1977, 1981, 1982; Seed Sci. & Technol 1982, 1982b; Acta Agric. Scand. 1982, 1985; Nord. Vet. Med. 1983), pulse and oil seeds (Mycologia 1981; Seed Sci. & Technol. 1982, 1985).

iv) Biological control of phylloplane and soil borne pathogens by antagonistic organisms (Z. Pflazeukr. Pflanzenschutz 1985a, 1985b, 1978; Pl. Soil 1982).

v) Mycoprotein from agroindustrial wastes and their use as animal feed (Pl. Soil 1979; International Biodegrad. Bull. 1981).

vi) Mycotoxins in stored seeds and reporting of a new mycotoxin AcT_1 from *Aspergillus caudidus* in rice (Mycopathologia, 1989).

In 1981, SIDA again invited me for 3 months as a Visiting Professor to deliver lectures at different institutes under Uppsala University, Uppsala Agricultural University and seed Research Station in Stockholm. During this visit a short research project on mycotoxin formation in stored grains was worked out in collaboration with Prof. Per Haggblom (Head, Swedish Animal Nutrition Laboratory, Uppsala), which was later published.

In 1991, I was invited to visit Uppsala by Swedish National Academy (Uppsala Chapter) in its inaugural year as one of five invitees from different countries who had done their Ph.D. in Sweden earlier. The puspose was to have interactive discussions on research with Swedish scientists, which were being done as follow up in their respective countries.

On October 31, 2003, I retired at the age of 65 after serving the department for more than 39 years. I was given a warm farewell by the department in presence of the V.C. and many administrative officers of B.U. followed by a lunch for all.

The department celebrated golden jubilee on September 14 and 15, 2013 and I was invited along with all other past teachers. The department felicitated all past teachers and nonteaching members in presence of Minister in charge of Science and Technology and Biotechnology Prof. Rabiranjan Chatterjee and V.C. On that function, standing on the dias in front of hundreds of past and present students, my heart was full of great happiness and satisfaction with the thought that I also contributed something as a founder member of the department. Often Prof. Bhaduri used to say that he had a vision and wanted to establish an ideal postgraduate department of Botany, which would be not only an excellent centre of teaching but also a centre of research. In fact many of the former students had shown their acumen in teaching and research in India and abroad. On the basis of continued research activities of the department, UGC gave due recognition by including it under Special Assistance Programme (SAP) in 1991. Subsequently, SAP programme was continued as Departmental Special Assistance DSA I, DSA II and DSA III since 2007. Lastly, I could feel that what late Prof. Bhaduri dreamt of as his ideal department had in reality come true in its fullest sense.

Balen Nandi
Alumnus, 1960

A few thoughts on myself

I completed B.Sc. (Hons) with Botany from Presidency College, Calcutta in the year 1958. Since I had high myopia with – 6 power in both eyes, I was not sure if continuing with further study will be good for my eyes, So I was looking for a job and got the chance of getting the post of Asstt. Manager in British incorporated agency Tea garden in Assam. The salary offered was Rs.800/- p.m. during the probation period of two years. The scale of Asstt. Manager was Rs.1200/- to 1800/- per month, when the starting pay of IAS and IPS was Rs.350/- p.m. I went to Dr. P.N. Bhaduri, Head of Botany Deptt. of Presidency College to tell that I am going to join the Tea Garden. He was extremely unhappy and said why then I took Hons. in Botany and spoiled the scope of another student to study with Hons, the seat of Hons. in Presidency College being limited. Still since the result of B.Sc. (Hons.) was not out and would take about two months time, I decided to join the Tea Garden and moved accordingly. I got a bungalow as my accommodation in the Tea Estate. My Manager and Asstt. Manager was Europeans and found tremendous class difference there. The labour agitation had already started due to this class difference – affluence and opulence in management level, deprivation and lack of basic facilities in the workers level. My specific job was to ameliorate the situation. In the meantime B.Sc. Hons. results were out and I got J.C. Nag Memorial prize for doing best result from Presidency College in Botany Hons. Due to combination of the insecure position in Tea Estate and advice of Dr. P.N. Bhaduri given to me earlier, I decided to resign from Tea Garden and continue with my studies.

I joined Calcutta University in Botany M.Sc. course. We had no "Ghosh Professor". Dr. Ilabanta Banerjee, as reader, was holding the post of Head of Deptt. We had amidst others, most handsome looking Dr. Sachin Banerjee as Lecturer in Mycology & Plant Pathology and Dr. A.K. Sharma as most promising lecturer in Cytology. I decided to take thesis in Cytogenetics under Dr. Sharma. On joining the M.Sc. course, I got seniors like Nripenda about 8 years senior to Upenda and me about 5 years senior to me working as research scholar/fellow at paltry salary/stipend of Rs.135/- to 160/- p.m. This was a depressing scenario to me. Dr. S.N. Banerjee was also discouraging me in continuing with M.Sc. stating that after 25 years of service even being Ph.D., he is still a lecturer getting a salary of about Rs.600/- p.m. only. However, having no options then, I continued with my study in M.Sc. Botany but was looking for better job elsewhere.

In course of months one day before the election in University, Pratul Lahiri and Rudra Prasad SenGupta to stand for elections from Ballygunge Science College approached me. I told them that I have never done student union earlier so why they are approaching me. They told that as per guidelines existing then, the 3 key posts of university students union President, Vice President & Secretary has to be one each from Asutosh Building (Arts), APC Road Science College and Ballygunge Science College. They have ascertained that if I stand in election, I will easily win. In that event, they will make me Vice President of Central Union. I won the election and Student Federation (S.F) won the majority of the seats and I was elected Vice President of Central Union. Next day in the newspaper report came out that in Calcutta University students Union, S.F has won majority of the seats and all key office bearers are from S.F. Though I was personally not involved with any party but my name appeared in the list associating me with S.F.

In the month of Sept 1960, Public Service Commission selected me for joining the Indian Forest College in Dehradun. There were 3 candidates from W.B. and my name appeared in the top. I was very happy but question arose that if I join Dehradun Forest College in 1st October what will happen to my appearing in M.Sc. Examinations, which were fixed in November and December. Dr. Sachin Banerjee advised me to forget about M.Sc. Examination quoting about the case of K.L. Lahiri C.C.F./W.B. & K.N. Chowdhury C.C.F. Andaman & Nicobar island, who were much junior to him but were drawing a salary of Rs.2000/- per month while he was drawing only about Rs.600/- p.m. Dr. A.K. Sharma and Archanadi, however, advised me that, if possible, I should complete the M.Sc. Examination by taking leave, because in future not doing M.Sc. degree might become a deterrent to my career growth. While I was in dilemma about what to do, I never realized that some other problem was there in store for me. By the middle of Sept. other two candidates from W.B. got their appointment letters but my appointment letter did not come. When I checked up with proper quarter why it was so, I was told that verification of my antecedent from police had not reached them. When I contacted police authorities in Calcutta, one officer harshly said, "canvassing disqualified a candidate". I went to various quarters to know what was the correct status, when one officer took pity on me and showed me the paper cutting, which indicated that S.C. Dey a S.F. Candidate has been elected as Vice President of Calcutta University Central Student Union.

I argued with that officer that I was never involved in any active politics and no case was in record against me. The officers then asked me a number of questions, which I cannot divulge here because that could be taken as a breach of secrecy and privilege. However, thereafter he asked me to go. I came out but was worried because Durga Puja vacation was only two days away and if I do not get the appointment letter before that, then I will not be able to join Dehradun in time leading perhaps to consequential problems. However, the star was in my favour this time and I got the appointment letter in the afternoon of last working day before the Puja vacation. This was the price of my being the Vice President of Calcutta University Central Students Union, which I was reluctant to join.

I joined Dehrdun Forest College in time and continued with the rigorous training course with diligence and got highest mark in the 1st tour examination. So when the question of returning to Calcutta came twice for appearing in the examination, once for theory and again for practical, I was told by Dean, Indian Forest College that the examination period clashes with another field tour and if I miss the tour then I also miss the marks for tour examination which will be a disadvantage for my securing high position in final result that determines the service seniority which was more important to me. I then consulted the C.C.F. West Bengal and a few others but the advice given was divided. So I myself decided not to come back to complete the M.Sc. Examination. Thus I missed the M.Sc. Degree but was rewarded by getting the 1st position with Hons. from Indian Forest College in the whole batch. How that helped in my career build up over subsequent 50 years is a different story.

S. C. Dey
Alumnus, 1960
IFS (Retd.), Ex-Secretary General,
Global Tiger Forum & Ex-Member
Secretary, Indian Board of Wildlife,
Govt. of India

CALCUTTA UNIVERSITY CENTRAL LIBRARY

My Exposure to Postgraduate Botany Class, C.U.

In 1958 to 1960, I studied Master of Science degree course in Botany Department, University of Calcutta. I still remember the first day of my class when the then Head of the Department Dr. Ilabonta Banerji welcomed us (me and thirty-nine other classmates of which twenty were from the then Presidency College), in the ground floor lecture theater of our department at Tarak Nath Palit's main building. At that time, the department was distributed in two buildings-one at ground floor of main building and another at top floor of the main building as well as on annexed building. Cantelliver corridors connected the two buildings at first and second floors.

The entrance of the main building had colonial type drive-in with round columns. They supported a high ceiling. First and second floor verandas were above the drive-in. These were converted to practical classroom for zoology department at the first floor and for botany department at the second floor. Our annual reunions were held in drive-in space. Behind the building entrance, there was a spacious landing from where a staircase went up to first and second floors. Our telephone operator sat there with instruments.

Behind the landing, there was a big lecture theater with a mahogany desk, a magnificent black board and two rows of students' desks. These furnitures are still visible in our department. On the right hand side of the lecture theater there were two teachers' chambers with adjacent research laboratories. One for plant physiology of Professor Dr. Sourindra Mohon Sircar, FNA, who was Sir Rashbehari Ghose Professor in Botany and another for mycology and plant pathology of Dr. Sachindra Nath Banerji. Behind these labs there was a plant physiology practical classroom. On the left hand side of lecture theater paleobotany research laboratory of Dr. Jiten Sen existed.

Apart from four above-mentioned faculties (Dr. I. Banerji, Prof. S.M. Sircar, Dr. S.N. Banerji and Dr. J. Sen) one Honorary Lecturer Dr. Kalipada Biswas, Director of Medicinal Plant Board, Government of West Bengal, also took our theory classes in the ground floor lecture theatre. The adjacent annexed building had an entrance that led to the students' canteen. A staircase went up to the Anthropology Department (first floor) and Botany

Department (second floor). On second floor there were two researches laboratories – one for anatomy and embryology of Dr. I. Banerji and another for cytology of Dr. Arun Kumar Sharma. In addition the department library situated opposite to these laboratories. Another lecture theater and two practical classrooms of our department were at the second floor of the main building. The approach to these rooms, from the annexed building was via a hanging corridor. This arrangement suggests that the adjacent annexed building was via a hanging corridor. This arrangement suggests that the adjacent annexed building was a later addition to the nineteenth century gothic style main building.

Tradition of two lecture theaters still prevails in our department. There were two practical classrooms at the second floor by the side of Lecture Theater – one was for algae, bryophytes, pteridophytes, angiosperms and embryology and another for cytology and other experimental works including fossil slide making.

The then HOD Dr. I. Banerji, F.N.I. was a hard taskmaster. He was very strict about students' behavior and disciplines, not only within classrooms but also in the science college campus. On the other hand Professor S.M. Sircar, Dr. S.N. Banerji, Dr. J. Sen and Dr. A.K. Sharma were student-friendly.

Dr. I. Banerji took our theory classes on angiosperms and plant embryology in ground floor lecture threatre. He took practical classes in second floor practical classrooms. Dr. Banerji was a very hard taskmaster and strict for students' discipline. He taught us to draw practical lessons by Chinese ink in practical class itself, and he signed our notebooks in same day. That training helped us a lot in subsequent career. Mr. Prafulla Kuamar Bose, only demonstrator of the department at out time, helped Dr. Banerji in practical. Dr. Banerji affectionately called Mr. Bose as 'Lord Bose'. Dr. Banerji retired in the same year when we were examined, in 1960. Professor Sircar replaced him as HOD in the same year. The voice of Dr. Banerji still echoes to my ear "Prafulla, this is my last batch I shall look after them dearly".

Our batch made a record score in the university by holding twelve first class positions. That number could go up if not Subhas De, who joined the Forest Department as IFS, and Shyamal Majumdar, who joined Pineapple Research Center at Malayasia as Research Scientist skipped M.Sc. examination at the last moment. That does not mean that our examination process was easy. Rather it was very tough. Outside the state examiners made the questions and evaluated our answer scripts. We missed Professor Sircar for our fifth year class. He went to Japan for research work on plant hormone. In his place Dr. Subhas Chandra Dutta took our classes on plant physiology for a few months. He was one of our alumni. Dr. Dutta joined this department as guest lecturer, after obtaining his Ph.D. degree on plant physiology from an US university.

After his return to the department, Professor Sircar taught us plant hormone, flowering, germination, photoperiodism, vernalization etc. Our practical classes on plant physiology and biochemistry under him were refreshing. Most of them reminded me my honors course practical classes in sophisticated manner with sophisticated instruments.

Dr. S.N. Banerji had beautiful feature. Students liked him. He took our mycology and plant pathology theory and practical classes in the ground floor of the main building. His training on culture practices helped me a lot at my postdoctoral period. We all liked Dr. Jiten Sen's classes. He took gymnosperm theory classes in the ground floor. Dr. Sen was young and student-friendly. He was one year senior to Prof. Sharma. His chamber and research laboratory was at the ground floor of the main building of Ballygunge Science College campus. In practical class, Dr. Sen taught us to make fossil slides by transferring fossil imprints on cellulose membranes. We liked grinding the fossils on rotating disk, then treated with acetic acid and other chemicals, and then transferred onto acetate membrane. It was a marvelous experience. I saved those imprints for many years.

Dr. Sen took us to the excursion at Darjeeling and adjoining places during our sixth year. Subhas and myself, who were also class representatives during 1958-1960 were acted as treasurer-cum-managers for that field trip. It was my first management training. Dr N.K. Chatterjee another guest lecturer took pteridophyta classes in the upstair classroom. For genetics, plant physiology (part) and taxonomy (part especially on Cucurbitaceae) lectures we had to go to the Botany Department of the Presidency College – twice a week to attend genetics lecturers by Professor Param Nath Bhadhuri, taxonomy lecture by Dr. Hiralal Chakraborty and ascent of sap and other plant physiology lectures by Dr. Jatendra Kumar Chowdhuri. After those lectures we had to return to the Science College, for practical classes.

Students also liked Dr. Arun Kumar Sharma, FNA, who has charming personality. As stated above he was the youngest faculty of our department. He too took his cytology and bryophyte classes in the second floor lecture theatre. The charm of Dr. Sharma's theory classes was, he first delivered the lecture, quickly, and then dictated the same. I was quick in taking notes while he delivered his lectures. So, I could take notes on both deliveries. To my utter surprise, I found both notes had almost identical contents. This photographic memory of Professor Sharma still exists. He could remember names of his students even today, at the age of ninety. It was his humanitarian attitude. He enquired about every student – his or her academic as well as personal problems. Therefore, all students liked him and his lectures.

As a result of his repetitive deliveries Dr. Sharma's lectures were imprinted on my memory. He seldom followed routine textbook for his lectures. Rather he opted for recent topics on cytogenetics from journals. In my student life, I found his knowledge on different branches of botany was thorough. As a result I often consulted him outside cytogenetics. It helped me. During practical class on cytology and genetics, in the up-stair practical classroom we performed somatic and meiotic chromosome preparations and bryophyte sections and staining. If any student failed to produce good preparation Dr. Sharma personally did the preparation for him or her.

Already researches of Dr. Sharma attracted attention of eminent scientists like Professor J.B.S. Halden. We came to know that when Subhas and myself went to invite Prof. Halden to be our Chief Guest during the annual reunion, he agreed to come to the department and declined later on when he came to know that it was a students' reunion function. So, we approached Professor J.C. SenGupta, who was then Director of Botanical Survey of India, to be our Chief Guest.

A quality of Dr. Sharma I came to know when I intended to take my thesis paper in sixth year. Earlier, I was determining to take plant physiology as my thesis paper. From abroad Prof. Sircar agreed to have me as his research student. In the meantime Dr. Mihir Banerji of Zoology Department advised me to approach Dr. Sharma to work on plant chromosome. Accordingly I approached Dr. Sharma who told me that as his quota for two students were already full I have to wait for a vacancy in near future. After a few days Dr. Sharma called me at his chamber and informed me that, by request of one of his Ph.D. students (Dr. Ramen Mukherji) he agreed to take as a third research candidate who got less mark than me. He then offered me thesis paper. I was spell bound by his integrity. However, later on he took another student through a written examination of several other students.

During my thesis paper research for one year I published three papers in foreign journals. His personality impressed me so much that when Dr. Wardlaw asked me to join his lab to work on gymnosperm, and later Dr. Manton asked me to work under her on chromosomes I could not accept these offers because Dr. Sharma advised me to do my Ph.D. thesis under him. He told instead of pre-doctoral research post doctoral researches are more fruitful. I accepted his advice, and since then my association with Dr. Sharma persists.

My experience shall not be complete unless I tell my students union and other extra-curricular activities in the campus. I was one of the class representatives being office bearer of Ballygunge Campus Students' Union in 1958 to 1960. Representatives from four departments namely agriculture, anthropology botany and zoology participated in our union activities. Representatives from zoology and botany departments often had difference of opinion. One of such dispute led to outsourcing canteen operation from students' union, to a private person. This was a bad spot of our union activity. Otherwise, students of four departments mixed cordially. Other activities of my student life were outdoor games in our campus ground. For indoor games we often went to small student hostel that was used formerly for horses by Sir Tarak Nath Palit.

Rajat Kanti Chaudhuri
(1960 alumnus)

Anecdotes on the trail for plants

Search for plants may take one to places that are exotic and beyond the known tourist circuits where unexpected incidents remain etched in the mind for the lifetime. Strangers or people, in general, may turn out to be friendly and hospitable, once they start trusting and help even by going out of their way. Only signs and gestures effect often communication. The thrill of finding particular plants, one is searching for, remains very personal.

My first encounter in field exploration has been a lifetime experience. It was as a member of the Botanical Survey of India in the Joint Scientific Expedition to The Great Nicobar Island in 1966. The expedition consisted of scientific staff members of the ASI, BSI, GSI, ZSI, and persons from the departments of public health, meteorology as also of the Bombay Natural History Society. There were about forty such persons and about sixty forest laborers from the Andaman & Nicobar administration. Great Nicobar is the southernmost Island of the group of islands. Tropical rain forest there was virgin. There was no road, no house, no potable water and no civilized men except the two who were deputed to operate the wireless station opened a few days back specifically for the expedition. There was no dock; the ship carrying the party had to anchor far away from the shore at Campbell Bay, which is situated at the southeast corner of the island. Transshipments of men and materials had to be made by boats (about ten in number and towed along with our ship). Tents were pitched after clearing some ground under the forest canopy. Trenches were dug around the tents to spray carbolic acid lest snakes sneak into the tents. A well was dug for getting the supply of fresh water. Folding cots and latter cots made of sliced canes and logs made our beds. After a few days we realized that the island had no venomous snake and no wild animal. The only danger was from pythons, quite abundant there. Our first encounter with a python occurred on the very first morning. We woke up and everybody went to see a large mound covered with fallen leaves. In it was pieces of a very large python. The great snake transgressed where Joda, the coastal nicobarese and our guide was sleeping along with his 12-year-old son, Lal Singh. The duo sensed the python when it coiled around the little puppy, they took with them. The boy fixed the head of the python with a spear, and the father cut it into pieces, covered the heap with fallen leaves around and went to sleep again. The pieces were used as baits for fishing near the shore and the catch was good enough to feed 100 people's lunch and dinner that day. Our new colony had a central store from where rations were provided to each team. Each of the survey parties was allotted 4 labors.

Our exploration started in right earnest after three or four days of arrival. Traversing under the canopy of the rainforest was a bit difficult. Though the forest floor was clear of undergrowth, it was dark and large buttresses and dangling vines made passage slow. One has to mark road signs by slashing the bark of every alternate tree left and right at chest height to facilitate return to the camps. Amongst other tricks in the forest, was getting water to quench thirst from cut stems of canes. We explored the length and breadth of the island, and collected a lot of plants. Dr. K. Thothathri, our team leader was an experienced explorer and he assigned me to write the notes he dictated. The notes were taken immediately after a collection was made and before it was put in the collection bag. Among my team mates were S.P. Banerjee, who taught me the intricacies of revisionary studies; P.K. Hajra, later becoming the Director of BSI; and G.D. Pal, who authored the book on the Flora of Arunachal Pradesh. It was a joy to find in *Psilotum nudum, P. complanatum, Lycopodium phlegmaria, Ophioglossum pendulum, Gnetum scandens, G. ula, Cyathea albosetacea*, etc in their natural settings, about which we have read in text books or have seen preserved specimens only. After completion of our exploration in and around our base camp at Campbell Bay, we moved on to other locations.

Our next camp was at Galathea Bay. A rocky formation jutted out there in the sea, which formed the southern most tip of India and was known then as Galathea Point (since renamed as Indira Point). From there we moved to Casuarina Bay, with a beautiful crescent shaped beach lined with coconut trees and forested slopes. There we decided to follow the Dogmar River upstream to explore for the Shompens, an aboriginal tribe. The few Shompens we met were very timid, naked and sickly. We presented them colorful clothes and some food and lured them to the campsite. Our next camping sites were Pulo Babi and Pulo Kunio. In each of these later sites, there was a hut, with a lady in charge of the household and some kids. The lady had a wrap around only to her waist. The huts were on raised platforms, with thatched roofs. They had fruits of pandanus as the staple food. They collected thick juice of the fruit after scraping it with a part of a bivalve shell, stored in lumps for future use. Of course, coconuts provided them the necessary drink and an alternate food. Theirs was a matriarchal polygamous society.

Mr. Humayun Abdul Ali, from BNHS and a cousin of the great ornithologist, Mr. Salim Ali, was the oldest member in the party. He too was an ornithologist and always used to keep his gun with him. Once, while taking our dinner, Mr. Ali asked us about whether any one of us could hear the call of a bird. It was nighttime; he took out his gun and followed the sound and returned soon with a bird. He put the dead bird on the table, and operated it to bring out a seed out of the stomach. Finding no answer to his query about the identity of the seed, he put the seed, just extracted, in his mouth and exclaimed, "Oh, it is jamun" and spitted. He was a strange man but did not stay with us for long. He accompanied the leader of the party to spend time at Kamorta, an island a bit north and with a naval base. Once we received a cryptic message that read "SNAKE BITES ALI STOP DEAD STOP". Every body was wondering but soon we learnt that a snake had indeed bitten him but he grabbed it with all his force. He went to meet a doctor at the naval base and narrated the incident to him. The doctor got anxious to treat him but he pacified him by showing the dead snake dangling from his hand. He further said that had the snake been a venomous one he would have been dead by the time he reached the doorstep of the doctor.

My next engagement with field exploration happened at the prompting from Prof. Lincoln Constance of the University of California, Berkeley. He happened to be one of the external examiners of my thesis on Indian Umbelliferae. It included a plant then named as *Heracleum pedatum*. The plant lacked details of mature fruits, which was essential for its proper generic identity. Prof. Constance offered me one thousand dollars to explore for the plant. I brought the matter to the knowledge of Prof. A.K. Sharma, our revered teacher and the then Head of the Department of Botany, Calcutta University. Sir had reservations about taking foreign grant for the purpose because probably of his nationalistic bent of mind and asked me not to accept Prof. Constance's offer. He gave me one thousand rupees and ordered me to get out and find the plant. I searched for the plant in all the places of its recorded occurrences but failed to find it. Munnar then was a small place only with rolling tea gardens and a factory of the Tatas. Through their courtesy I got an accommodation at their guesthouse. After 17 days of search in the Pulney hills, I was returning empty handed, fully dejected. I put my two haversacks on the top of the bus at Kodaikanal and went on the other side of the bus for relieving. Oh God! There was the plant growing luxuriantly with mature perfect fruits. I collected all that I could, put them in polythene bags, still drenched and dripping. Later it turned out to represent a new genus, *Vanasushava* described by Prof. Constance and me. The fancy to find such umbellifers, incompletely known or known only in types, caught my imagination and that passion drove me to various places for the decade and half.

I dreamt of visiting Gossainthan in Nepal from where N. Wallich got his collection of new species of umbellifers. Soon, we set out to trek to reach the place. I was accompanied by one of my brother-in-laws, a trained mountaineer. There were three small villages enroute and we were kindly granted stay in some of the homes in these villages. They gave us food charging only a nominal price. Our next post of visit was Sayabrubensi where there was a small commune of Tibetan refugees. We learnt that they belonged to the khampa tribe and appeared fearsome. Lamas there were busy doing their assigned works; collecting fuel woods, tending cultivation, but still came to pray whenever they found a break. We were allowed to stay in their Gompa. Communication in any language was not possible. But with the going of a bell, we followed people to arrive at the commune kitchen for tea (typical Tibetan salted butter tea), lunch and dinner (steamed dough of bajra flour, steamed cabbage and smoked pieces of yak meat). There I got the first puff of '*charas*'. I found a European traveller emptying the tobacco out of a cigarette. From a vial of vitamin C, he took out a small pill, held it on the tip of a knife and burnt it on the fires of a matchstick. After mixing the ash with the tobacco, he packed them in the emptied cigarette. After lighting it he smoked it for a puff or two, handed this over to the next man and finally to me, as I was in the circle- the usual practice. The pill, I learnt later was made of the exudates from the female spikes of *Cannabis sativa.* As a man travels he rubs his hands around the spikes when exudates stick to his palm. One has to scrap his palms and roll them in pills to make the days harvest. Next we reached Kiyangchin, where one white man was operating a cheese factory. We had only yak milk for our drink and cheese made out of that milk for dinner. The altitude was about 13000 feet.

Next year I was visiting Sandakphu, Phalut and Dzongri for collection of Umbelliferae in the temperate and alpine zones. While crossing the tree line before Sandakphu, I met Mr. Oleg Polunin, the author of the well-known book on plant geography and also the co-author (with A. Stainton) of the pictorial book '*Flowers of the Himalaya*', coming down with his accomplishes. It was mid October, and we had put on woolen sweaters and wind proof jackets but this heavily built gentleman was wearing only shorts and a vest with slippers under his feet. Finding plants peeping out of our collection bag, he stopped for a brief introduction. He was almost a regular visitor to the Himalaya, the whole of Himalaya in fact, visiting most of the places more than once. Knowing that I was teaching in a university, he said in half a jest that he was only a schoolteacher. A schoolteacher, indeed; who has contributed so much to botany, making us to realize our Lilliputian existence!

My trip to the Bababudan hills in Karnataka was learning one. After getting off the bus at the last road head, one had to trek to reach the hills. I was alone and asked people for the route. I reached the last village, and sat on the verandah of a mud house after a long walk uphill. The owner offered me water and enquired about my purpose of visit. He asked me to wait for the batch of pilgrims soon to arrive there. Somehow, I was able to make him understand the plant I was searching for. Immediately, he brought out a bag full of seeds of *Heracleum rigens*. He confirmed that I was visiting in a wrong season but offered me a handful of seeds. Luckily, the seeds germinated to grow and I understand that it still grows in the botanic garden to UC, Berkeley. By the way, Bababudan has shrines for both Hindus and Muslims, and pilgrims from both the faiths visit the place. At that time, pilgrims used to come together, assemble in a place to proceed as a party only after the arrival of the priest with a gun. Tigers often roamed that place. Hawkers selling tea and snacks were also a part of the party.

Arriving to a place for the search of a particular plant in wrong season occurred more than once. Visiting Matheran, near Bombay in December, I found only dried bare stems of the plant. On my repeat visit next year in the month of September, I found the place flushed with slush; the place had service lavatories then and it was raining heavily. I got an infection in my parotid gland resulting in a swollen face with intense pain. Fortunately, overcoming the odds, I found the plant in the desired state and this too was also described as a new genus *Pinda*. I got a bonus too in the form of *Polyzugus tuberosus*.

Back in Karnataka, I was visiting Kemmangundi in some later years. Getting off at Birur station, I took a bus to reach Kemmangundi, unaware of the route. All my co-passengers were local people. After sometime, the bus started its journey on a ghat road through forests. It was afternoon when the bus stopped midway and all the passengers got down and vanished in the forest. The driver or the conductor told me in sign language that the bus would return back to Birur, as the road ahead was closed to traffic. One of the co-passengers finding my dilemma took pity on me. Fortunately he could speak Hindi. He asked me for my destination and purpose. He made it clear to me that it was impossible to reach Kemmangundi at that time of the day. The other alternative, as suggested by him was to stay there. He showed me a tourist lodge under construction there. Only one room had its doors and windows fixed with a clean floor, somehow livable. Then we descended to a clearing after a brief walk. A fantastic sight revealed before me; a roaring falls was leaping down some 500 feet or more from the forested hills above. A small Shiva temple was there and also the place had two huts for the priest and his family. My savior spoke to the priest in their mother tongue, arranged for my food for the night. It was steaming hot rice, some ghee, smashed potato and hot milk with some jaggery. It was one of the heartiest meals I ever had. The following morning, as I was travelling with my guide to Kemmangundi, we heard a vehicle coming down. A jeep came and screeched to halt; the person driving it enquired me of my identity and purpose of visit. He was the owner of the coffee estate we intruded in. Then he asked me to get into the jeep, turned the vehicle back and drove to his Bungalow. The gentleman was kind enough to offer me breakfast after introducing me to his wife and kids. Then I was taken round the estate and make collections. After a hearty lunch, he took me straight to Birur, when we bade good-bye to each other.

A stranger turning friend occurred another time. I boarded a bus from Ooty to Bangalore, stopped it midway and disembarked. After an hour or so, I found the road passing through a dense forest and I realized that I was nearing Mudumalai sanctuary. I got scared of wild animals. Finding a car coming from the opposite direction, I waved it to stop. The car stopped and I introduced myself and request for a ride to Ooty. To my amusement, I was invited to get into the car in bangla. The gentlemen driving the car were in charge of some farm selling machinery to tea gardens there. He took me to his residence in Coonoor and I was introduced to his wife. In the meantime, the gentleman had informed Amlan Aich, a few years junior to me about my arrival. Amlan was then posted in the Tea Board there. Amlan arrived in his scooter while we were enjoying a breakfast. He reprimanded me for not informing him of my visit as if it was a pre planned one. I spent the night at Amlan's quarters enjoying the company of Supti, Amlan and their son.

Himalaya beackoned me more than once. This time we were planning to visit north Sikkim and any visit there then required clearance from the IG, Police. At Gangtok we met the officer but we failed to convince him of our purpose. An IAS officer, for whom we had some introduction, took us straight to Mr. Kazi Lenduph Dorji, the then Chief Minister of Sikkim. He wrote his approval on our application then and there. Armed with the Chief Minister's endorsement, we proceeded only to be stopped at Tong, some distance ahead of Chungthang. The military denied us passage and we learnt that the real boss to grant permission was the military. We returned, but only to revisit the area next year. Wiser this time, we approached first the Indian Mountaineering Foundation for permission. And next we applied to the Ministry of Defense along with approval of the IMF. Clearance came in no time; the same gentleman who was concurrently the Chairman of IMF and the Secretary of Defense signed both the approvals. This time we were in military net, free to move. We trekked to Thangu from Lachung, and then via Momeysamdong to the post at Karen ahead of Cholamo. The last part was very difficult for us; we were at an altitude of about 17000 feet, walking on a plateau for about 17 km. Before we reached the last post, two jowans were waiting for us under a rock shelter with thermos full of hot drink, kajus and butter. They relieved us of our backpacks for the last 4 km. Cholamo is a beautiful glacier lake from where Lachung Chu (or Teesta) originates. I collected some interesting alpine umbellifers. Heavy snowfall started at night and continued for the next two days. We were confined within the tents enjoying the hospitality of the military.

Visiting Kedarnath shrine some years later along with Jayanti and our children, Anindita and Rajarshi, I was blessed with the collection of a new plant by chance. I collected it along a small watercourse behind the famed shrine. Prof. Constance and I described it as new genus and species, *Kedarnatha sanctuarii*. Our action in giving a combined new generic cum specific description is cited as an example in the International Code of Nomenclature. I am really apprehensive of this species after the recent calamity at Kedarnath.

Locating japhoo hills in the Nagaland took some time. I wished to visit the place as two species of umbellifers were collected from there only once. I reached Kohima one afternoon and the taxi dropped me at the first available hotel on the roadside. After putting my luggage, I came out in search of food. There was a restaurant on the other side of the road and I went there for a cup of tea and snacks. I found a man taking his dinner early there. He told me to take the dinner before sunset, return to my hotel, bolt the doors firmly and not to respond to any call at any time thereafter till it is morning. Being scared I obeyed him. And truly, when it became dark I heard heavy thumping at the door and it continued intermittently for an hour or so. At the day break, I came out, surveyed the surroundings, gathering some courage I went out to search for another hotel. Some distance away was the bazaar with a few hotels where I shifted to one immediately. Then I went to meet the teachers in the Science College Kohima and enquired about Japhoo. Two local guys came forward and offered me to take me there the following day. Though we could not communicate with each other, my guides were very helpful in finding my desired plants, in spite of heavy rains and thick infestations of leeches.

From Kohima, I travelled to north Lakhimpur by air, and then to Itanagar by taxi. I was breathing hard and sweating profusely when I reached Itanagar. Saibal Das, Gourdas Pal, G. Giri and some others from the BSI received me and took me to the residence of Saibal. Alkananda and Saibal took special care of me and called one Mr. Dutta. I felt some relief after taking two or three doses of medicines administered by Mr. Dutta. After two or three days, same Mr. Dutta was instrumental in arranging my VVIP accommodation at Twang Circuit House. My return journey from Twang was by a truck, arranged by the ADC there. It was almost a repeat of "*Truckbahone Macmohane*" by Navanita Dev Sen. The driver of the truck obliged me by stopping wherever I could spot an umbellifer plant.

From Itanagar, I reached Gawhat to meet Jayanti and our children. We had plans to visit Manas Tiger Reserve and Shillong. I did not receive any reply from the Chief Wild Life Warden for the permission to visit the reserve. After a brief enquiry, I got the telephone number of the residence of the PCCF, Mr. Deb Roy. I met him in the evening at his residence. After brief introduction, he kindly wrote a letter of introduction addressed to the Chief Wild Life Warden with the request to allot us the suit that was served for the Forest Minister of Haryana, as this person had postponed his visit. We reached Manas on the evening of '*Saptami*' day, and were joined by the PCCF and his family the next morning. We crossed the Manas River to intrude into Bhutan on the opposite bank, where from I could collect some umbellifers.

After about three decades of my engagement with the umbellifers, I opted to explore other areas of research. I found that the family Piperaceae needed a fresh look and so visited Arunachal again. On my first try with the collection of *Piper* species in nature, I got a scare of my life. As I set my foot in the forest on way to Itanagar, a cobra or something like that, raised its hood and hissing. I realized that pipers and vipers coexist. I returned to the Piperaceae some years later but to study them only in herbarium.

However, after some years, with the alibi of collecting pipers, I joined a party led by Sumitra di, Sibdas da, Sateysh da and Nanda (Profs. Sumitra Sen, Sibdas Ghosh, Sateysh Roy and Nanda Dulal Paria), of the Advanced Center to Arunachal Pradesh again. Traversing a forest appeared less dangerous as we moved in a group. We visited Namdapha and Mon; the last one situated at a trijunction of Arunachal Pradesh, Nagaland and Myanmar. The tribal homes there had the gateways and walls outside decorated with the skulls of '*Mithuns*'.

Meanwhile, I got interested in the climbers and lianas. To study them under different forest systems, my students and I visited Namdapha, Kerala, Orissa, West Bengal and other places. Once while in Chapramari in north Bengal along with Debasmita and Soumi, we were staying at the forest rest house there. One fine morning, we spotted Mr. Gautam Ghosh, the noted film director supervising trimming of the lawn and hedges in front. Soon, his team arrived for shooting of a film. There after arrived Mr. Soumitra Chatterjee, the famous actor and Ms. Debasree Roy, the noted actress. Mr. Ghosh approached us and requested help in shooting his directorial film "*Chokh*". He required one of the bedrooms specifically. Since the FRH was under our reservation and finding his earnestness, we were glad to cooperate. Their engagement continued till 10 in the night and in spite of our inconvenience, we let them to continue. In exchange, we got a first hand experience of the tedious business of film shooting, the number of 'takes' the actors are subjected to and overall the funny side of the scare in Ms. Roy when she was attacked by leeches.

I returned to the Andamans after many years. This time my interests were on the serpentine ecosystem. For the serpentines, I received the collaboration of Amal (Prof. A.K. Paul). We decided to visit the Rutland Island, situated just off Chiria Tappu, south of Port Blair. It was a forested island, with no road, and no rest house of sorts but with plenty of water and electricity from 6 to 10 pm. One of the accompanying forest guards took us to the hut of Mr. Venkat Rao, a settler there. This gentleman became our 'mama' and his knowledge of the island appeared as a boon to us. When I showed him the false color composite of the image of the island and enquired if I might expect to find dwarfed plants on a particular point on a peak, his immediate reaction was the exclamation as to how do I knew that. He promised to take us to that place the very next day. He took us to the hills and peaks, through the dense forest, helping us in field verification of the serpentine localities and in the identification of some of the serpentinophytes (Nickel hyper accumulators). He provided us shelter in his hut, and to make us comfortable arranged cots and food. Even, while guiding us in our exploration, he would catch fish for us. He had the habit of carrying the fishing net and a machete while travelling. We craved on his indulgence to visit his place repeatedly, even in his absence. His helper, Francis, was instructed to help us on our unannounced visits. He even helped my students, on their visits. An exceptional man, a born leader among the islanders there, he was modest but with a very big heart.

I miss the days of my field studies as health and age has taken over. Recalling the wonderful memories of places and people, the treasures of my life, gives me pleasure and these are shared here to enthuse wanderlust amongst the readers.

Prasanta Kumar Mukherjee
Alumnus, 1964

Reminiscence of a Botanist

Sitting in the seat of a writing reminiscence, it reminds me of various past experiences of my student life in the Dept. of Botany and service life. There is no doubt that student life is a thrilling one, which makes our heart dancing in freedom and joy. It is very interesting to remember an education tour conducted by our college to pay a visit to various institutions in Kolkata including Indian Museum. That time we were very surprised to see the "Fossils" beautifully preserved in the Indian Museum. While we were observing this valuable museum specimen, we remembered Sri Ramakrishna Paràmhanshadeva who paid his kind visit once to this august museum, and after seeing the 'Fossil' he was surprised also to know as how a tree had become a 'stone' falling under the earth for years after years.

However, having been awarded B.Sc. degree in Botany when I was admitted in M.Sc. classes in Botany in the University of Calcutta, I came in contact with a galaxy of Botanists and discovered in them the divinity of sincerity in extending the utmost care and service to the Botanical specimens. In remembering my student life in the science college, University of Calcutta, I felt some glorious moments when I attended lectures of Prof. A. K. Sharma in my special paper on Cytogenetics. Prof. Sharma was very affectionate with the students. Whenever he delivered lectures it seemed to us as if he was telling a story to his children in his house. He has the capability of teaching a hard subject in a very simple way so that the students could not feel difficulties in grasping it very quickly. Actually, he was the teacher who felt the pulse of the students first, and then he injected the value of his teaching into their appropriate veins so that they could remember the subject for a long time. I am very fortunate that I have been asked to write reminiscence, and in connection with this I have got an advantage to remember again the sweet relations between the teachers and students. Actually the teachers with whom I came in contact were very affectionate with the students.

After passing my M.Sc. examination, while I got an opportunity for carrying on research work on "Pharmacognosy" under the supervision of Dr. P.C. Dutta, I was overwhelmed with his personality. He was a very simple and affectionate person. It was very difficult to forget him since his technique of giving guidance to a research student was so sweet and worthwhile. Besides his well-recognized academic career, he was religious and mediated upon God, under the discipleship of "Mother Anandamayee".

Since we were the students of Botany, we had to collect Botanical specimens from various places of our study. While we were studying M.Sc. we went to Kashmir, Murshidabad and few local tours and collected some important specimens from different areas. Not only that, those tours were thrilling and interesting to remember in my student life.

In recalling my past experience acquired from service life, it is also very thrilling and interesting. The institution where I got employed is the glorious Indian Museum which was fortunately established with botanical specimens and art objects in the building of the Asiatic Society of Bengal, in the month of February, 1814, by a memorable Danish Botanist Nathaniel Walliche, later on all the specimens of art work were transferred and displayed in the present building of the Indian Museum. All the specimens of Botany were transferred from Asiatic Society and displayed in the present building of the Industrial Section on 1, Sadar Street.

The Indian Museum is the oldest and largest institution in South-East Asia. It has now become a multipurpose and multi-disciplinary institution of Indian national importance. I have been in connection with our work in this vast museum of about 60 galleries distributed in six principal sections Art, Archaeology, Anthropology, Zoology and Botany (Industrial section). Interesting fact is that although I am a student of Botany I got attached with the other sections, which are inter-related. While I went round the Archaeology galleries with the visitors I wondered to see the depiction of trees in the sculptures and monuments and this has inspired me to find out the causes as to how Archaeology has been indispensably related with Botany. It is felt that without the depiction of trees, Archaeological specimens could not be made successful and meaningful art specimens. This has encouraged me to write a thesis on "The visible plants from Early Indian Sculptures (a study based on the depiction in stone and terracotta sculptures housed at the Indian museum, Kolkata)". In doing this, I came in contact with some interesting stories developed in connection with Indian religion and philosophy as to how different types of Brahmnical and Buddhist sculptures developed. Study of trees in connection with the study of Indian religion and philosophy makes a man purified and divine. If I had not come to serve Indian Museum, I would have been deprived of the touch of purity and sanctity of the trees.

Once in the early part of my service life in the museum, I had seen a fine exhibition of Botanical specimens in our exhibition hall, which had enough educative value. The display was organized in such a way the ordinary visitors were seen standing before the display of Tulsi plant to learn something valuable for its use for curing diseases from kidney, liver, heart etc. They asked me many questions and finally, they offered their thanks to the organizers of the display. It reminds me of its importance in this modern period, so that the museum workers can organize from time to time on various plants, which have medicinal value.

In evaluating the display of various Botanical specimens in the Industrial section, once we conducted "Visitors Behavioural Study". In studying visitors' attitude, I had collected very interesting remarks from the visitors. Having seen a large number of Botanical specimens in a place, the visitors become glad because they could be able to discuss some medicinal value in the plants. I was delighted much when I talked to them in Botanical gallery explaining the value of medicinal plants in the gallery and also in the Bharhut Gallery in Archaeology section, pointed out depiction of various medicinal plants on the remains of the Bharhut Stupa.

In connection with the study of visitors' behavior I had collected some good remarks from the foreign visitors also. They were very much pleased with the display of Fiber, dye-yielding plants in the industrial section. The authorities (BSI) of Industrial Section were very much praised by the visitors since they had imparted various techniques of education in cultivating different crops in their educative display. The visitors also had formed a good opinion in favour of display showing the model of Indigo cultivation as stated in Dinabandhu Mitra's book 'Nildarpan'. During that time I published "Psycho-analysis of the visitors in Industrial section, Indian Museum, Calcutta" (Indian Museum Bulletin, Vol. XI, No.2, 1976).

Besides, under the auspices of ICOM Russian President, I had to visit several museums in Russia in December 1994. I visited also Dhaka University and Dhaka Museum, Bangladesh, in January 1997 and attended the International Seminar organized by Dhaka Museum and Botany Dept. of Dhaka University. While I was paying my visit to the museums in Russia, I visited Bio-Science Gallery, which exhibited objects of Botany, Zoology, and Human Physiology & Anthropology in one place. This was very interesting and was of much educative value.

Analyzing my reminiscences, I should say one thing that the study of Botany will be successful and meaningful if the readers have enough respect and reverence for each and every specimen of Botany as the devotees extend their devotional service to their God.

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Indian Museum

Distribution of Mangroves in Different Mangrove Habitats of India with Special Reference to Sundarbans and Phyto-Succession in Different Inter-Tidal Zones

The Department of Space (Govt. of India) has mapped the Indian mangrove areas using satellite data, with 83-90% accuracy. However, these areas under mangroves as calculated from these maps, do not match with earlier data. According to the satellite data, total mangrove area was 4,474 km^2 as against 6,740 km^2 as reported earlier by the Ministry of Environment & Forests (Anonymous, 1987). These low value of mangrove areas as shown by satellite data may be due to the following reasons: (a) reduction in mangrove area, (b) mangrove area smaller than 25 ha may not mapped properly and (c) the mixing of mangroves with adjoining forest area, especially in the Andaman-Nicobar group of islands (RSAM, 1992).

The Sunderbans in West Bengal has the largest area of 4,200 km^2 (Anonymous, 1987), which forms the largest single block of mangroves of the world taken together with the Sundarbans part of Bangladesh. It is the only mangrove forest of the world having the famous Royal Bengal Tiger (*Panthera tigris tigris*). The name "Sunderbans" may be derived or taken either from the Bengali name of '*Sundari*' tree, *i.e. Heritiera fomes* or as the beautiful (*Sundar*) forests or it may mean both (Naskar & Guha Bakshi, 1987). The Sunderbans is famous for its richness and diversity of mangrove flora with dominant species, viz., *Avicennia* spp., *Sonneratia* spp., *Excoecaria agallocha, Ceriops* spp., *Rhizophora* spp., *Bruguiera gymnorhiza, Phoenix paludosa* etc. (Naskar & Guha Bakshi, 1982 & 1987). Naskar & Mandal (1999) and Naskar (1994). The forest is now largely confined to a number of islands, more than 50 island situated on the east of the Hugli river mouth (Naskar & Guha Bakshi, 1982 & 1987). India's globally renowned conservation scheme, *i.e., 'Project Tiger'* was initiated on 23rd December, 1973 in Sundarbans, West Bengal and thus it also has the distinction of being one of the first Tiger Reserves amongst India's Nation wide network of 27 Tiger Reserves (Jain, 2001). Sundarbans Tiger Reserve (STR) is situated in the coastal districts of West Bengal, *viz.*, 24-Parganas (South) and 24-Parganas (North) covering the southern most extremity of the lower Ganga delta bordering the Bay of Bengal.

Sundarbans mangrove forest and ecosystem have the uniqueness for having good number of mangrove plant species, mangrove inhabitant fauna including world-renowned 'Royal Bengal Tiger' *Panthera tigris tigris*. This area was also potential for having large group of fish species, prawns, and crabs and with unique tropical climate for good production of agricultural crops, etc.

Andaman and Nicobar islands harbor a rich diversity of mangroves. Dense mangroves are found on the edges or margin of the islands, along the creeks, near bays and lagoons with dominant species, *viz., Rhizophora mucronata, Rhizophora apiculata, Rhizophora stylosa, Bruguiera gymnorhiza, Avicennia spp., Ceriops tagal, etc.* Mangroves occupy an area of about 1,152 km^2 by Sidhu (1963); further information on acreage of mangroves on these islands is provided by Singh *et al.* (1986), Rajagopalan (1987), Dagar (1987) and Dagar *et al.* (1991). Mapping of mangroves has also been carried out on the Andamans and Nicobars by National Remote Sensing Agency (1988). Ranganath *et al.* (1989) used satellite data to map mangrove distribution on eight islands, *viz.*, Havelock, Peal, Nicholson, Wilson, John Lawrence, Henry Lawrence, Inglish and Outram islands in the Middle Andaman. Bangla & Menon (1989) gave a figure of around 66,261 ha of mangroves in the Andaman Nicobar islands. The mangrove areas of south Andaman Islands have also been mapped through remote sensing (Krishnamoorthy *et al.*, 1993) and about 770 km^2 mangrove area recorded by Remote Census (RSAM, 1992).

The next dominant mangrove area is in Orissa coast; here the mangroves are present mainly on the Mahanadi delta, the Brahmani – Baitarani delta and along the Balasore coast with dominant species, *viz., Avicennia* spp., *Rhizophora mucronata, Excoecaria agallocha, Ceriops decanda,* etc. (Banerjee *et al.*, 1989). The mangroves near the mouth of the Mahanadi River form a creek network of the Luna, the Jambu, the Kharnasi, the Khola and the Batighar Jora creeks. The creeks are arranged parallel to the coast, inundated by regular tides. The Bhitarkanika mangroves are luxuriant due to the freshwater flooding by the Brahmani and the Baitarani rivers and their distributaries and creeks upon the terrain. On Balasore coast, there is no or little influence of fresh-water inflow except in the Dhamra river mouth; as such, here the salinity level remains high except in rainy season. In spite of these, few mangrove patches are also identified, *viz.*, in the Subarnarekha mouth (Sanyal *et al.*, 1999).

In Andhra Pradesh, dense mangrove vegetation is found towards coast rather than on shore-land because of the dense branching network of creeks, which exist towards the coast (RSAM, 1992). There is the major mangrove vegetation on tidal flats on the western side of the Krishna delta than that of the eastern side. Dense mangroves are also reported over recent sand/mud spits on the Nizampatnam bay (RSAM, 1992). Sparse mangroves are also found on the eastern side of the Krishna delta.

Mangroves in Tamil Nadu exist on the Cauvery deltoid areas. Pichavaram has a well-developed mangrove forest dominant with *Rhizophora* spp., *Avicènnia marina, Excoecaria agallocha, Bruguiera cylindrical, Lumnitzera recemosa, Ceriops decanda* and *Aegiceras corniculatum.* Sparsed mangroves also occur near Vedaranyam, Kodiakarai (Point Calimere), Muthupet, Chatram and Tuticorin.

True delta lands are absent in Kerala and the mangroves are restricted to some minor estuaries, *viz.*, Cochin Estuary, in Vembanad mangrove areas within backwater zones; mangroves of Cochin estuary at Kerala coast are now negligible. Distribution of mangroves in Ketala has been described by Basha (1991).

Mangroves of Karnataka cover an area of 60 km^2, of which 10 km^2 are in utter Kannada district alone (Untawale & Wafar, 1990). About 14 species belonging to 9 genera are sparsely distributed in Karnataka. Present status and management of the mangroves of Uttar Kannada, Karnataka have been reviewed (Sivabalan *et al.*, 1991). Mangroves of Karnataka cover an area of 60 km^2, of which 10 km^2 are in Uttar Kannada district alone (Untawale & Wafar, 1990). Abot 14 species belonging to nine genera are sparsely distributed in this district. The mangrove forest occurs along the northern coast of Karnataka, in the Kalindi, Gangivali and Agnachini estuaries and at the confluence of the Chakra Nadi, Kollur and Haladi Rivers near Gangolli (Parnetta, 1993). In general, the mangroves are only sparsely distributed along the Karnataka coast.

In Goa Maharashtra, mangroves exist especially in large patches along the Mandovi estuary, the Vasistha estuary, The Savithri estuary, the Kundalika estuary, the Dharamtar creek, the Panvel creek, the Vasai creek, the Thane creek and the Vaitarana creek (Untawale, 1992).

Gujarat has got the second largest area of mangroves according to the remote sensing data (Table 2). The mangroves on the Rann of Kutchch are poor along the Kori creek (RSAM, 1992). In the Gulf of Kutchch, dense mangroves are reported around the Patre creek, the Dide Kabet, Valsura, Navlakhi and Kandla and near Mundra jetty. Patches of sparse mangroves are observed near Okha, Poshitra, Pindhara, Dhani, Narara, Sikka, Jindra, Pirotan and near the Jakhau port (RSAM, 1992). The mangrove species *Avicennia officinalis* and *Rhizophora mucronata* dominate on the Gulf of Kutchch. On Saurashtra coast, mangroves occur only in sparse patches along the creeks on the intertidal mudflats along the Jafarabad creek and the Buthrani creek. In the Gulf of Khambhat, mangroves are distributed along the coast near the Mahi, the Dhadhar, the Narmada, the Kim and the Sena rivers. A small patch of dense mangroves is found on the Aliabet Island. In South Gujarat, mangroves exist near the mouth of the Kolak estuary and a small creek near Umargam. On the Konai creek, mangroves are present scattered (RSAM, 1992).

East coast mangroves of India

Mangroves of Sundarbans – the World-renowned

Sundarbans mangal of India in the Lower Ganga Delta cover about 65% area and spread over an area of 4266.6 km^2 of the estuarine tracts of the Ganga delta on the southern parts of the 24 Parganas district (S & N) in West Bengal.

The mouths/deltas of the Hugli River (The Ganga), the Mahanadi, the Krishna, the Godavari, the Cauvery, the Mandovi and the Zuari are the major mangrove areas in India. Mostly, these dominant deltas or estuarine mangroves exist on the East Coast of the Indian Territory, except the Mandovi and the Zuary rivers mouths of West Coast in India. In these, estuarine mouths and delta zones of the East Coast of India have about 70% of the total Indian mangrove areas and having more than 97% of major and minor mangrove species. The dominant mangrove areas (4267 km^2) and major mangrove ecosystem (65%) along with about 95% of the total Indian mangrove species were collected, identified and reported from the Ganga delta of Indian Sundarbans (Naskar & Guha Bakshi, 1987; Naskar & Mandal, 1999; Sen & Naskar, 2003; Naskar, 2004).

Indian Sundarbans is situated within the longitude 88°10'E – 89°51'E and latitude 21°31'N – 22°30'N, under the jurisdiction of both 24 Parganas districts (South and North) of West Bengal. This sea-land interphase ecosystem of Sundarbans comprises of about 55% forestland area and 45% water spread area in the forms of tidal river, creeks, canals and vast estuarine mouths of the river Hooghly, Baratala, Saptamukhi, Thakuran, Matla, Goasaba and Harinbhanga (Herobhanga), as encountered from west to east.

The total Sundarbans mangrove ecosystem is considered to be unique because of its species richness in terms of diverse mangrove flora, mangrove-associated flora, back mangrove species and several endemic typical mangrove associated fauna of different groups. As such, this unique ecosystem has been declared as the *'World Heritage Site'* and very recently it has also been considered to be designated as *'Ramsar Site'*.

Sundarbans mangrove ecosystem has attracted ecologists, scientists and researchers since the past few decades. Several world-renowned botanists have made significant publications since the year 1776, *i.e.*, the time of William Jones of the Asiatic Society of Bengal. William Roxburgh, the great pioneer and father of Indian botany, obtained number of interesting plants from the Sundarbans for the first time and reported in *'Hortus Bengalensis'*. Buchanan Hamilton and William Carey helped Roxburgh to authentically account these plants in his famous book *'Hortus Bengalensis'*, during 1814. The other pioneer works were that of Schlich (1875) *'Remarks on the Sundarbans'*, Sir David Prain worked on the flora of Sundarbans in the early Twentieth Century (Sir David Prain 1903a, 1903b, 1903c and 1905). Besides, Tensley & Chipp (1926) found that certain conditions of soil make the development of the climatic climax permanently impossible and vegetation ultimately developed on such soil is best considered as an edaphic climax. Troupe (1926) shared this view and stated that edaphic forest formations are well represented in India and among the most obvious examples, which may be mentioned, are the mangrove and tidal forests of the littoral region. Comprehensive working plan of Sundarbans dealing with ecology and resources with emphasis on forest resources was done by Curtis (1933). The map of Sundarbans prepared by Rennel (1779) is well used as a benchmark, when next changes were documented by the surveyors Dampier & Hodges (1831), who marked in 1830 the northern boundary of Sundarbans mangrove plants to demarcate the exact inter-tidal zone. Champion (1936) classified the tidal forests under primary seral type of moist tropical seral formations and did not regard the mangrove as a climax or pre-climax forest types. Champion & Seth (1968) later made one of the most comprehensive assessments of the vegetation communities of the Indian Sundarbans. Chaudhury & Chakraborty (1973) divided the forests into four types based on tidal level as i) high tide; ii) above general tide level; iii) frequently inundated by salt water and iv) below tide level. Naskar & Guha Bakshi (1982) grouped this forest into five major zones as (i) *sea face or beach forest*, (ii) *formative island flora,* (iii) *flora of reclaimed land and low lying areas*, (iv) *flora of river banks* and (v) *swamp forest type.*

Naskar & Mandal (1999) have worked out extensively on the ecology and biodiversity of the mangrove ecosystem and highlighted the morphology and anatomy of the mangrove species. A recent publication by Ghosh, Mukherjee, Sen, Dasgupta and Naskar (2002) has inventorised 112 species of mangroves, mangrove associates, back mangroves, parasites, epiphytes and beach flora for the entire Sundarbans mangrove habitat area of West Bengal. Some works, which need mention, are the ecological works of Chakrabarti (1986a, b & c; 1987a, b & c) about the man-eating behavior of the tiger by Chakrabarti (1982 & 1985). Chaoudhury & Chakrabarti (1985), Nandi & Misra (1987) and Mandal & Nandi (1989) have studied in detail and published about the fauna of the Indian Sundarbans.

A detailed study on the Calcutta peat which originated from Sundarbans have been studied by Banerjee (1984), who ascertained the prograding character of the delta during last 2,740 years at a deposition rate of 0.82 mm/y in the face of easterly tilting of Bengal basin and eustatic rise of sea-level. Vegetation of dynamics of Indian Sundarbans due to changes suffered from neotectonic movement and its economic importance has been highlighted by Sanyal & Chowdhury (1983). Sanyal & Chowdhury (1984) worked extensively on the dancing state of existence of plant consociations in Sundarbans. The oscillatory behavior of Sundarbans delta complied with glacial aggressions and eustatic chantes of sea level rise has been well documented by Roy Barman (1992). In the previous years, Morgan & Mcintire (1959) have recorded the eastward tilting of Bengal basin, and resultant delta progradation has also been established from peat studies by Banerjee (1996). During pre Farakka barrage period however, the Forest Survey of India noticed retrogression in forest blocks of Indian Sunderbans. Retrogression was also noticed in case of Sagar lobe by Chakrabarty (1991), just after fateful finding of Milliman (1989) about high threat of sea-level rise in subsiding Bengal coastline. But, the post Farakka scenario on Sundarbans delta remains to be ascertained. Naskar and Guha Bakshi (1987) worked extensively and published on the succession of mangrove flora in Sundarbans.

Sundarbans is the silt-accreted delta, developed on the mouths of the vast Ganga-Brahamaputra (Meghna) system. The silt-accreted delta are formed with gradual processes of silt accretion and interacted by several tidal rivers, creeks and canals and ultimately formed by hundreds of large to small islands. These delta lands periodically or frequently inundate with tide water and obviously silt and clay settled and dominated there, where *Porteresia* sp. grass and other plant species grow step by step followed by several tree and major mangrove species, *viz.*, *Avicennia* spp., *Sonneratia* spp., etc. In these mangrove habitats, several mangrove dwelling fauna, *viz.*, tiger, Deer, Wild Boar, Rhesus Monkey, different species of minor wild cats, different species of both migratory and residential birds and other fauna get shelter for breeding, rearing of off-spring as this mangrove area is ideal dwelling place for having abundant food and peaceful or danger free shelter.

Among the Indian mangroves, these Sundarbans mangal is rich with mangrove species diversity along with several groups and number of interesting faunal diversity. The total forest areas of these Sundarbans mangrove forest zone are about 2200 km^2 and its surrounding tidal water spread areas or estuarine rivers, creeks and canals cover about 1865 km^2. These estuarine rivers and creeks are much potential for nurturing vast quantities and varieties of finfish and shellfish species and aquatic minor to major fauna.

Mangroves of the Mahanadi Delta of Orissa coast

The Orissa coastal mangal, *viz*., the Bhitarkanika mangrove forests occupy an area of about 150 km^2, which is about 2% area of the total Indian mangals, are situated within the latitude 19°N and 22°N and longitude between 85°E and 87°E. The river systems, *viz*., Brahmani and Baitarani form the deltaic mangrove zones in Orissa coast; besides these Sanyal *et al.* (1999) had reported about 200 km^2 mangrove areas from the mouth of the river Subarnarekha. The Bhitarkanika mangrove in the Orissa costal areas is the 3rd important mangrove area in India, *i.e.*, after Sundarbans and Andaman & Nicobar Islands mangal (Naskar & Mandal, 1999). Mangrove areas of the Orissa coast are both dense and sparse, which are estimated through Satellite imagery as 108.5 km^2 and 84.4 km^2, respectively (Anonymous, 1992). In Government of India publication (1987), Indian Mangrove Status Report (1987) has mentioned 120 km^2 mangroves areas present in the Mahanadi and 30 km^2 mangroves in the other coastal zones / deltas in Orissa State. Jagtap *et al.* (1993) have reported the total mangrove area in the Orissa coast as 210 km^2 and the total mangrove species as 36 numbers. But, Blasco (1975) has reported only 50 km^2 mangrove area present in the Orissa state; these mangroves are distributed in three zones, *viz*., (i) Mangroves of the Mahanadi Delta, (ii) Mangroves of the Brahmani-Baitarini Delta and (iii) Mangroves of the balasore coast. Naskar & Mandal (1999) have reported the following mangroves and mangrove associated species from the Orissa coast based on the reports of other workers and their own studies, *viz., Rhizophora apiculata, R. stylosa, R. mucronata, Bruguiera gymnorhiza, B. sexangula, B. parviflora, B. cylindrical, Ceriops decandra, C. tagal, Kandelia candel, Avicennia alba, A. marina, A. officinalis, A. marina* var. *Acutissima, Sonneratia apetala, S. alba, S. caseolaris, S. griffithi, Xylocarpus granatum, X. mollucensis, X. mekongensis, Aglaia cucullata, Aegiceras Corniculatum, Heritiera fomes, H. littoralis,* *H. kanikensis (?), Lumnitzera racemosa, Excoecaria agallocha, Schyphiphora hydrophyllaceae, Derris trifoliate, D. heterophylla, Atalantia correa, Cynometra ramiflora, Acanthus ilicifolius, Sueda nudiflora, S. maritime, S. monoica, Salicornia brachiata, Sesuvium portulacastrum, Porteresia coarctata, Myristachya wightiana, nypa fruticans, phoenix paludosa, Cerbera manghas, Dalbergia spinosa, Sarcolobus globosus, S. carinatus, Dolichandrone spathaceae, heletropium curassavicum, Caesalpinia bonduc, C. crista, Hibiscus tiliaceous, Thespesia populnea, T. populneoides, Tamarix dioca, T. troupii, Brownlowia tersa, Clerodendrum inerme, Scirpus littoralis, Tylophora tenuis, Finlaysonia obovata, Barringtonia racemosa, Stenoclaena palustris, Acrostichum aureum, Intsia bijuga, Mucuna gigantean, Ipomoea tuba, Cynometra iripa, Piuchera indica, Salvadora persica, Salacia prinoides.* Bhitarkanika mangal is also declared as an important sanctuary, with several endangered species of flora and fauna and also declared as the *Wildlife sanctuary'* for having wide spectrum of *'Genetic divesity'*. This Bhitarkanika mangal is the important natural breeding place for estuarine crocodiles, *Crocodilus porosus* and several species of threatened sea turtles, *viz., Lepidochelys olivacea, Batagur baska* and the king crab, *i.e., Carcinoscorpius rotundicanda* and *Tachypleus gigas*. Several dolphin species, *viz., Platinista gangetica, Neomeris phocaenoides, Sotalia plumba* are also present in this Bhitarkanika mangal (Naskar & Mandal, 1999).

The river water in and around the Bhitarkanika become less saline during the monsoon months, as such good number of the mangrove-associated species turn these mangals as rich plant species diversity zone.

The mangrove belt in Kendrapada district called the Bhitarkanika mangrove forests has been notified as Bhitarkanika Sanctuary (672 km^2) 9vide notification No.6958/FF AH dtd. 22.04.1975). Part of this area (145 km^2) is notified as 'National Park' (vide Notification No.19686/F & E dated 16.9.1998 of Forests & Environment Department, Govt. of Orissa). This later stretch of mangrove is the only area, which is relatively well preserved. Mangrove vegetation in Mahandadi delta region between Baruei mouths to Mahanadi mouth (Paradip) is fragmented and degraded due to large-scale encroachment of these areas. Further south, sparse mangrove vegetation occurs along the coast from Mahanadi mouth to Devi mouth. Degraded mangroves also occur to the north of Dhamara, mouth up to Chudamani in Bhadrakh District coast, and also on Subarnarekha mouth in Balasore District.

The important research work conducted in the Bhitarkanika mangrove areas need mention of Banerjee (1984), wherein the vegetation of Bhitarkanika has been studied. Further, Banerjee (1985) did a comparative study on the mangroves of Sundarbans with the mangroves of Mahanadi delta. Also Bustard & Choudhury (1980) studied the saltwater crocodile *Crocodylus porosus* which happends to be an endangered species in India. They stressed that habitat destruction by reclamation and clearing of the mangrove areas were posing most serious long-term problems for the biodiversity of the area. Conservation programmes operational in Orissa, West Bengal, Andhra Pradesh, Tamil Nadu, Andaman and Nicobar Islands since mid-seventies have not been too adequate and suggested that a well managed commercial utilization of this valuable economic species could help to ensure the future of the sanctuary areas and with them the crocodiles, as well. Panda & Singh (1999) evaluated the extent of human interaction and interference responsible for the environmental degradation of the Bhitarkanika – Gahirmatha region. Choudhury *et al.* (1999) gave emphasis on adequate awareness for the conservation of mangrove species and their judicious utilization. They also highlighted the need for rehabilitation of mangroves in areas where they have disappeared. Orissa mangrove areas arte potential and well known for providing natural breeding ground for several species of the sea turtles *viz.*, *Lepidochelys olivacea, Batagur baska* and the king crab, *i.e., Carcinoscorpius rotundicanda* and *Tachypleus gigas*, Several dolphin species, *viz.*, *Platinista gangetica, Neomeris phocaenoides, Sotalia plumba* are also present in this Bhitarkanika mangal (Naskar & Mandal, 1999).

Mangroves in the Andhra Pradesh in the Godavari delta, the Krishna

The deltas and Coringa mangroves are spread over an area of about 200 km^2, which is about 3% area of the total Indian Mangals. In the Andhra Pradesh coastal areas the mangroves are situated within the latitude between 13°30'N and 19°00'N and longitude between 80°05'E and 85°05'E. The major estuaries, *viz.*, the Godavari and the Krishna form the delta in the costal areas of Andhra Pradesh. These estuaries and delta comprises the bays, tidal creeks, extensive tidal mud-flats, spits, bars, mangrove swamps, marshes, ridges and swale areas and coastal alluvium plains (Anonymous, 1992). Few pockets of mangroves are present on the inter-tidal flat land at the mouth of the Sarada river and near Visakhapatanam. These mangrove areas are also distributed in several minor islands, mouth of the estuaries, tidal flats on both sides of the tidal creeks and the river mouths. Dense mangrove areas are reported as 263.3 km^2 on the Nizampatam Bay, Machilipatanam Bay, on the western side of the Krishna delta. Sparse mangroves of an area about 88.7 km^2 is also reported on the land-ward side of the high and inter-tidal mud flats in the eastern side of the Krishna delta; scattered mangroves are also reported from an area of about 4.7 km^2 area (Anonymous, 1992). On the junction of the Coringa River at Bay near Kakinada, several patches of mangroves are reported (Naskar & Guha Bakshi, 1987). According to the recent estimate, the mangrove areas on the Andhra Pradesh are 322.7 km^2 (1992); while Sidhu (1963) has reported 1,3304 ha mangrove area from the mouth area of the Krishna River. Blasco (1975) has reported only 100 km^2 mangrove area in Andhra Pradesh and the Mangrove Status Reported. Government of India (1987) has reported about 200 km^2 mangrove area of the Andhra Pradesh.

The major mangroves and associated species reported from the Andhra Pradesh are as follows, *viz., Thizophora mucronata, R. apiculata, Bruguiera gymnorhiza, Ceriops decandra, Avicennia alba, A. marine, A. officinalis, Sonneratia apetala, Lumnitzera racemosa, Excoecaria agallocha, Acanthus ilicifolius, Aegiceras corniculatum, Scyphiphora hydrophyllacea, Suaeda maritime, S. monoica, S. nudiflora, Salicornia brachiata, Arthrocnomum fruticosum, Porteresia coarctata, Myriostachya wightiana, Xylocarpus moluccensis, Sarcolobus carinatus, etc.* (Naskar, 2004).

Mangroves of Muthupet, Pichavaram and Chhatram areas of the Cauveri delta in Tamil Nadu coast

Spread over an area about 150 km^2 areas-about 2% of the total Indian Mangals. From the coastal zone of the Tamil Nadu only about 30 km^2 mangrove areas were reported (Anonymous, 1987); these mangrove areas are spread over in the river mouth at Pichavaram in Cuddalore, Vadaranyam, Point Calimere, Muthupet, Chhatram and the Tuticorin. The Pichavaram mangrove area alone covers about 13.6 km^2 mangrove areas (Venkatesan, 1996). In Muthupet area patches of mangroves areas are reported by the earlier workers (Anonymous, 1987). Though the Tuticorin and Pamban Island had dense mangrove forest few decade back, large-scale exploitation and cattle grazing has caused maximum damage and turned these mangrove areas to naked coastal sands, dominated by the exotic *Prosopis* sp. According to different workers, these mangrove areas at the Cauvery delta are variable largely, *viz.*, Tirumalai Raj (1959) has reported the effected forest areas are only 10.08 km^2, but Sidhu (1969) has estimated as 26.50 km^2 mangrove areas from the Tamil Nadu State. Venkatesan (1996) has estimated as 148.97 km^2 mangrove areas including Pichavaram 13.58 km^2, Muthupet has 68.03 km^2, Chatram has 53,47 km^2, Blasco (1975) has also estimated only about 5.10 km^2 mangrove areas are present in the Tamil Nadu coast line.

Island Mangroves of the Bay of Bengal

The mangroves of Andaman and the Nicobar Islands cover an area of about 1190 km^2 of coastal flat land, which is about 18% of the total Indian Mangals. The Andaman Group of Islands are situated within the latitude 10°30'N and 14°00'N and longitude between 92°E and 94°E; while the Nicobar Group of Islands are spread over within the latitude 6°45'N-9°15'N and longitude between 92°E and 94°E. In these Andaman Groups, there are about 278 major islands (viz., Andaman, Middle Andaman, South Andaman and Little Andaman groups); while in the Nicobar Groups, there are about 30 major islands. These mangrove species are mostly distributed in narrow patches or strips on the sheltered coastal areas of these different islands. Here, the tidal inundation exists within 1.0-2.0 m MSL and the normal wave action is minimum due to close proximity of most of these Islands. Different mangrove workers had estimated the mangrove areas and mangrove species in Andaman & Nicobar Islands differently. According to the estimate of Dagar *et al.* (1991) the dominant major and minor mangrove flora in these Andaman & Nicobar Islands are 34 species. The dominant species were reported, *viz., Rhizophora apiculata, R. mucronata, R. lamarkii, R. stylosa, Bruguiera cylindrical, B. gymnorhiza, B. parviflora, B. sexangula, Ceriops tagal, C. decandra, Kandelia candel, Avicennia marina, A. officinalis, Sonneratia alba, S. apetala, S. caseolaris, S. griffithii, Heritiera littoralis, Xylocarpus granatum, X. mekongensis, X., moluccensis, Aegiceras corniculatum, Aegialitis rotundifolia, Scyphiphora hydrophyllacea, Lumnitzera littorea, L. racemosa, Excoecaria agallocha, Cynometra iripa, C. ramiflora, Nypa fruticans, Phoenix paludosa, Acanthus ilicifolius, A. ebracteatus, A. volubilis* (Naskar & Mandal, 1999, Debnath & Naskar, 2000 and Debnath, 2005). These mangrove flora and the mangrove zones of the Andaman & Nicobar Islands are least disturbed and best preserved in comparison to the other mangrove areas within the Indian Territories (Naskar & Mandal, 1999, Naskar, 2004 and Debnath, 2005). These mangrove species are scattered, distributed on the Bay Islands, which are the second dominant and best-preserved mangrove zone in the Indian Territory. Very recently, after the bad consequences of the Tsunami on 26th December 2004 it is urgently felt for undertaking the massive conservation and large scale plantation of the coastal dwelling mangrove species throughout the coastal areas in Andaman, Nicobar and other part of the country; all these efforts need assessment and analysis of the soil physico-chemical properties and studies or investigation on the tidal inundation nature of the different possible mangrove habitat areas.

The Andaman and Nicobar Islands have a total land area of 8,249 km^2 and a total coastline of 1,962 km, which is about one fourth of the length of total Indian coastline. Andaman-Nicobar Islands have also about 966 km^2 area of mangrove vegetation (Dagar *et al.*, 1991). In Andaman district, area under mangroves is 929 km^2, while in Nicobar district mangroves occupy only 37 km^2. Area wise A & N islands are second in the country, after West Bengal. The mangrove vegetation of these islands constitutes 9.4% of the total land area of 10.85% of the total forest area. Mangroves occur in these islands are mostly fringing on the tidal creeks, backwater and muddy shores. Along the creeks the width ranges between 0.5 km to 1 km. At places this salt tolerant mangrove community is found on rock shores subjected to tidal action and regular deposits of mud. Luxuriant mangroves can be seen in Shoal Bay (South Andaman), Yerrata Jetty in Rangat (Middle Andamans) and in Austrin Creek (Mayabunder). The areas under National Park include Marine (Wandoor), Middle Button Islands, North Button Islands and South Button Islands. The areas under the purview of Sanctuary include the Interview Island. Mangrove Island, Mangrove Reef Island. South Sentinel Island and Tillanchang Island.

The mangroves of Andamans have always fascinated to researchers; the important works that need mention are Chengappa (1944), who worked on the regeneration of mangrove forests in the Andamans; Banerji (1957) studied the evolutionary statges of development and decline of the mangrove forests. He cited that the rate of change has been affected by the silting activity, raising salinity of soils, initiation of cultivation, *vis-à-vis*, land transformation activities, etc. The ecological aspects of Andaman were described by Mall *et al.* (1985). They chalked out the aspects that support mangrove vegetation as climatic conditions, geology, and substrates. Around 25 exclusive species (21 common and 5 confined to Andaman) of mangroves were found Mall *et al.* (1985). The proximal middle and distal zones were identified based on the distribution of mangroves. Alagarswami (1987) studied the mariculture potential of Andaman and Nicobar Island in an indicative survey. Mall *et al.* (1990) also conducted a comparative study of disturbed and undisturbed mangroves forests of Andaman. It was noted that mangroves forests of Andaman Islands are one of the best mangrove forests of the world having high floristic richness, complexity index and biomass production. Rapid development and population inflow in these islands has resulted in the clearance of certain areas of mangrove forests, due to which many species have been affected. Singh & Garge (1993) studied the mangrove swamps of Andaman Islands to know their ecological aspects. The geographical area covered, environmental factors existed. Ecological and physiological adaptation, taxonomic enumeration, pattern and process in mangrove forests, their functional aspects, nutrient status in mangrove ecosystems, causes and consequences of mangrove destruction and management of the mangrove resources were taken into account. Roy *et al.* (1998) addressed issues such as coastal erosion, acidification of ponds, change of soil condition, salinity intrusion, loss of habitats in certain important species and impact on ecological system of mangrove forest, wildlife, public health and socio-economic condition. Garge *et al.* (1999) studied the zonation pattern of mangroves in Andaman. Other literature, which require mention are Sahni (1953 & 1957), Thotharthri (1960, 1962 & 1981), Balakrishnan (1979), Das (1985), Alagarswami (1987), Balachandran (1988), Bagla & Menon (1989), Saldanha (1989) and Bandyopathyay (1991). Debnath & Naskar (1999) conducted a comparative studied of the mangroves of Sundarbans with that of the Andaman. Very recently, Debnath (2004) has published a floristic account on the mangroves of Andaman.

West Coastal Mangroves of India

Mangroves along the Kerala coast

Kerala mangrove was stretching for about 1,000 km^2 a century ago, but is now reduced to just about 17 km^2 in isolated bits at Kumaragom, Dharmadom, Chettuva, Nadakavu, Pappinisseri, Kunjimangalam, Chateri, Veli, etc.

The Kerala coast has beautiful beaches, minor estuaries and lagoons. Coachin estuary, Kumargom, Dharmadon, Cheltuva, Nadavavu, pappinisseri, Kunjimangalam, Chateri, Veli, etc. have small-scattered mangrove patches. Only sporadic mangrove patches are present in this Kerala coast, covering about 45 ha only (Anonymous, 1987). Ramchandran *et al.* (1986) has reported the following mangrove areas from the Kerala coast, *viz.*, (a) Veli-estuary, (b) Quilon, (c) Kumarakon, (d) Kannamali (Cochin), (e) Chetwai, (f) Nadakkavu (Calicut), (g) Edakkad, (h) Pappinisseri, (i) Kungimangalam and (j) Chittari. During the beginning of 20th Century and much latter than that the Kerala coast had dominant mangrove areas in the back water and once the mangrove species diversity were also very good up to 1920. These Kerala coastal mangroves were reclaimed, cleared and exploited for developing backwater fisheries, shrimp farm, coconut plantation and for the development of habitat land and also due to the development of the Cochin harbor.

The West coastal mangrove species and mangrove areas of Karnataka state, Maharashtra and Gujarat states are comparatively less in number and these West coastal mangrove areas are also in very much degraded or threatened conditions due to heavy exploitation and encroachment by the local people and grazing by the domestic cattle and the wild ass and camels, as well. The in depth of this west coastal mangrove areas and species diversity are worked out and reported by Untawale *et al.* (1985). The mangrove researchers of NIO, Goa have also conducted different aspect on mangroves research and also tried to undertake the mangrove afforestation activities since the early 80s.

Mangroves of the Coondapur and the Malpe Bay, at Karnataka coast

Covers about 0.4% area; in the Karnataka coast 60 km^2 mangrove areas exist with scattered patches at Coondapur estuary, Malpe and Karwar along with few mangrove species.

The Karnataka coastline is extended about 320 km long from north to south, within the latitude 12°45´N and 15°00´N and longitude between 74°00´E and 75°00´E. In this coast line, the mangroves areas are (i) Kungimangalam and (j) Chittari fringing type, in the inter-tidal zones, covering about 50 km^2 area (Untawale & Wafar, 1986); but based on the satellite imagery about 12.5 km^2 mangrove area is reported by Anonymous (1992). According to the Government of India Mangrove Status Report (1987) the mangrove areas in the Karnataka coast was about 60 km^2. Several rivers, after originating from the Western Ghat meet the Arabian sea and form wide and extensive estuaries, lagoons or back-waters; in this inter-tidal zones the mangrove vegetation are fringing type and in its back on the upland the sand dune vegetation grow; but in these coastal water marine algae and sea-weeds are plentiful (Rao *et al.*, 1980). The soil in these coastal areas is mostly clayee; water and soil here are polyhaline to moderate saline. The major mangrove areas in these Karnataka coast are Coondapur estuarine complex, along the river Sharavati at Karki fall, Haldipur, Dhareshur, Khonavar. Coondapur is the confluence zone of 3 rivers, viz., Chakra, Kolluru and Haladi. Here about 307 ha inter-tidal lands have developed with good mangrove palnts; these plants are *Avicennia officinalis. A. Marina, Rhizophora mucronata, R. apiculata, Acanthus ilicifolius* (Unawake & Wafer, 1986). Next to Coondapur, the distinct mangrove patches are noticed at Malphe and Karwar (Untawale, 1980). Besides all these, the Kalinadi, the Bemdarnadi, the Ganga valid and the Gnashing are the other rivers, where the mangrove species grow in narrow fringing type. Other estuaries in Karnataka are Sita Swarna, Mulki and Kopal, where minor mangrove habitats are existed. Fringing mangrove was also present in the Netravati and near Kumta. Unawake & Wafer (1986) had reported total 14 mangroves, mangrove associated and sand dune flora under 9 genera of 7 families; these species are, *Avicenna officinalis, A. marina, Rhizophora mucronata, R. apiculata, Kandela candle, Sonneratia cassowaries, S. alba, Ceriops tagal, Aegiers corniculatum, Exoecaria agallocha, Acanthus ilicifolius, Clerodendrum inerme, Ipomoea pes-caprae* and *Spinifles littorales*, etc.

Mangroves of the Mandovi, the Zuary and other estuaries of Goa

Covers about 0.3% area; about 5-10 km^2 mangrove area in the Goa territory are existed at Mandovi, Zuari, Cambarjua canal and other minor river mouths.

Goa coast is situated in the Central-West Coast of India, facing the Arabian Sea and extended North to South. The total length of the coastline of Goa is approximately 120 km and lies within the latitude 150°00´N – 150°52´N and longitude 730°30´E – 740°44´E. The inter-tidal zones of seven minor estuaries are mostly flanked on both sides by the rocky cliffs and formed with salty-sand and salty-clay along with abundant organic matter. The minor estuaries in this coastal zone are Terekhol, Chapora, Mandovi, Zuari, Sal, Talpona and Galgibag. Beside these the connecting Kumbharjua canal links both the Mandovi and Zuari. The major mangrove zones are extended in the Zuari estuary and Mandovi estuary and the other sporadic mangrove patches are distributed in the remaining 4 estuaries and the Kumbharjua canal connecting Mandovi and Zuari estuaries. The Chorao Island is the protected mangrove area in about 160 ha. area, near the village of Chorao. This mangrove forest has been declared as Dr. Salim Ali Bird Sanctuary.

The literatures, which need particular mention, include Untawale *et al.* (1980), which deals with floristic survey of the mangroves of Goa. Parulekar (1984) described means of conserving mangroves at large. D'Souza *et al.* (1979) studied the fungal population of mangroves of Maharashtra and Goa. Jagtap & Untawale (1980) studied the effect of petrol, diesel and motor oil on fruits of *Rhizophora mucronata* and *Avicennia officinalis,* Jagtap (1985) studied the ecology of mangroves along the Goa Coast. Santhakumaran (1985) conducted studies on destruction of mangrove vegetation by marine borers along the Goa coast. Untawale (1987) conducted research on the '*viability of fish seeds along the estuaries* *of Goa and Maharashtra*'. Santhakumaran & Rao (1988) have dealt with the serious problem of biodeterioration along the Goa coast and have identified at least 14 species of borers from this area. Untawale *et al.* (1989) had worked upon the various aspects of the mangrove environments of Goa based on data collected by NIO. Untawale (1992) had suggested rehabilitation programmes for the degraded intertidal marshy area, which the mangroves occupy. Untawale *et al.* (1992) have discussed the causes responsible for degradation of the mangroves of Goa. Untawale (1993) had detailed the nursery, afforestation techniques, budgetary techniques and the anticipated problems of afforestation of mangroves in the context of Goa. Jagtap (1994) studied the spatial distribution of various species of mangroves in an estuarien environment of Goa. Untawale (1998) explored the energy sources of mangroves and suggested possible ways and means for the sustainable management and exploitation of these resources. D'Souza (1999) analysed the sediment from estuarine and mangrove samples disturbed by various pollution and confirmed that sediment enzymes can be effectively used as indicators of pollution, besides their usual role in pollution control. Sardessai & Bhosale (2002) studied bacterial population from mangrove sediment and water samples from various sites of the Mandovi estuary in Goa. Borkar *et al.* (2002) prepared a balance sheet of costs and benefits of 'green consumerism' in the tourism sector in Goa.

Mangroves of the Ratnagiri and other estuaries of the Maharashtra

Mangroves of the Maharashtra cover about 5% area; in the Maharashtra coast, 330 km^2 of mangrove patches exist from the 5 coastal districts, *viz.*, Sindhudurg, Ratnagiri, Raigad, Mumbai & Thane; the major mangrove areas in Maharashtra coast are Manori bay, Vikroli bay, Mahim bay, Back bay, Colaba Beach, Malabar Hill, Worli Hill, Bandra Beach, Manori Beach, Versova Beach, Juhu Beach, Girgoan Beach and Elephanta Islands, etc.

Untawale (1987) has stated that till the year 1670, the Bombay coastal was covered with luxuriant mangroves in its seven islands. All these fringe and dense mangrove areas were cleared for human settlement, development of port and for rapid industrialization in and around Mumbai (Bombay). Now in and around Mumbai the following bays and beaches are notices with scattered and fringing mangrove species; these area having the past sign of mangrove vegetation are Manori bay, Vikroli bay, Mahim creek and bay, Back Bay, Colaba beach, Malabar hill, Worli hill, Bandra beach, Manoli beach, Versova beach, Juhu beach, Girgaon beach, etc. Besides these, mangrove patches are also noted from Ratnagiri, Raigad, Thane, Elephanta island, Waghotan, Rajapur, Dharma, Vasai (Ulhas), Shastri and Vikroli, etc. From these fringing and scattered mangrove patches few mangrove species were also reported by the recent publications; these species are *Avicennia oooicinalis, A. alba, A. marina, A. marina* var. *acutissima, Rhizophora mucronata, Bruguiera gymnorhiza, Kandelia candel, Sonneratia apetala, S. caseolaris, S. alba, Ceriops tagal, Lumnitzera racemosa, Aegiceras corniculatum, Excoecaria agallocha, Acanthus ilicifolius, Acrostichum aureum, D. heterophylla, Clerodendrum inerme, C. soratum* and *Salvadora persica*. Navalkar (1940, 1951, 1952, 1956, 1959, 1961 & 1974) and Navalkar & Bharucha (1949 & 1959) and few others have studied and reported detailed ecology, succession, distribution, floristic pattern and importance, chemical properties of the mangroves of the Maharashtra coast. But presently, most of these mangrove areas are in very much degraded or fully cleared for the rapid urbanization and industrialization activities.

Mangroves of the Gulf of Cambay and the Gulf of Kachchha of Gujarat

Covers about 7% area; in the Gujarat coast 260 km^2 true mangrove stretches or inter-tidal halophytic flood lands are present at Tapti and Nrmada estuaries, Gulf of Kachchha and Gulf of Khambhyat.

Once these above said mangrove areas and the mangrove species diversity in the Gulf regions of the Gujarat State were most dominant; but due to scarce and irregular rainfall along with heavy biotic interferences by wild ass, camel and for local demand for fuel wood, these Gujarat coastal mangroves were largely exploited and only scattered patches of few mangrove species were present there in vast open coastal sandy land (Govt. of India Publication, Ministry of Env. & Forest, 1987).

Gujarat coastline is extended within the longitude 68°E and 73°E and latitude between 20°10´N and 23°10´E. These entire coastal zones are much variable as varied physiographic, geomorphologic, neo-tectonic movement of rivers, creeks and ocean, where continuous river discharge prevailed. Besides these, the nature of sand, silt, rock and overall climatic factors are also variable from zone to zone in the Gujarat coast. Based on this geographical situation, geomorphologic position and variable nature of land or physiognomic condition, the Gujarat coastal zones may be divided under these following five regions, *viz*., (i) the Runn of Kachchh, (ii) the Gulf of Kachchh, (iii) the Gulf of Cambay (Khambhat or Khambyat), (iv) the Saurashtra coast and (v) the South Gujarat coast. Out of these five reigons, two Gulfs constitute the major mangrove zones of the Gujarat State. The substrate constituents, temperature, rainfall pattern, topography and the tidal ingress varies within these arid zones; in spite of all these, mangals of these zones are more or less similar in their qualitative and quantitative aspects. In these regions sporadic mangroves are distributed and the other major associated species reported are *Avicennia officinalis, A. marina, Rhizophora mucronata, Suaeda fruticosa, Aeluropus lagopoides, Cenchrus setigerus, C. ciliaris, Sporobolus marginatus, Cyperus rotundus, Salsola baryosama, Haloxylon salicornicum, Prosopis chilensis, Acacia nilotica, Tamarix dioica* and *Salvadora persica.* Among these, some of the species are not the mangroves, but halophytic adaptations and growth in the coastal areas and sand dune areas and very often seen. These entire mangrove areas of the Gujarat coast are very much degraded condition due to fire wood exploitation and camel and wild ass grazing.

Coral reef Mangroves

Mangroves of Coral reef of the Lakshadweep Atolls and Minicoy Islands of Arabian Sea

Species are negligible; only one species, *Bruguiera parviflora* is reported. In the Arabian Sea, the coral islands (Atolls) were previously called Laccadive, Minicoy Island and Amindivi Islands; all these islands are known since 1973 as Lakshadweep. This group of about 36 islands are situated 200-470 km apart from the Kerala coast, within the latitude, between 10°00'N and 12°00'N and longitude between 71°00'E – 74°00'E. Furthermore, the Minicoy Islands situated between the 8°18'N latitude and 73°00'E longitude, this is the southern most islands and about 180 km away from the Lakshadweep. All these coral atolls have NE and SW orientation, with the low lying islands on the east and a broad well developed reef on the west. In its centre, 1-4 km broad lagoons exist. Steep slope on the wind wards (east) side and lagoons on the west shelf deposit are of marine origin and all these islands are in the process of formation. The only mangrove species, *Bruguiera parviflora* was reported from these Atolls by Untawale & Jagtap (1984).

Dominant mangrove areas and major mangrove ecosystem (67%), along with about 90% of the total Indian mangrove species were collected and reported from the Ganga delta of the Indian Sundarbans.

World distribution of mangroves

There has been a worldwide concern over the damage caused to the coastal areas due to man-made and natural change. Various activities, which are being undertaken in the coastal areas and in surrounding seas, have resulted in the degradation of mangroves, wetlands, floodplains, sea grass beds and coral reefs throughout the world. The enormous degree of marine environment problems has led to the concept of Biosphere Reserve. This concept was initiated in 1964 during the International Biological Programme (IBP) under the auspices of the International Council of Scientific Union (ICSU). On the basis of this study UNESCO launched the Man and Biosphere Programme (MAB) on global basis in 1974. The concept of Biosphere Reserve encompasses human beings, their needs, problems and development as one of the components, which differ from sanctuaries where priority is given to wild life. *Man and Biosphere (MAB) Programme* of UNESCO launched in 1971 aims at developing a base for rational use or conservation of natural resources while improving the relationship between the man and environment. Besides, this objective is also to predict the consequence of man's interventions on nature today on tomorrow's world and thus increase his ability for managing the natural resource effectively. It also aims to fill the still significant gaps in the understanding of the structure and function of ecosystems and of the impact of different types of human intervention.

The important International publications on mangroves that have come out form time to time mainly include publications from Australia, Florida, South East Asian countries including India, Bangladesh, Pakistan, Sri Lanka, Thailand, Japan, Indonesia, Java, etc. and the coastal African countries. Some of such important publications, which require mention, would firstly dwell on the publication by UNESCO by Snedekar & Snedekar (1984) on the Research Methods in the mangrove ecosystem. The important publications of Chapman (1960, 1964, 1972, 1975, 1976, 1977 & 1978) have dealt with the salt marshes, coastal vegetating, mangroves and biogeography of mangroves. Brown & Fischer (1918) have worked on the flora of Phillipines. Mac Nae (1966, 1968 & 1974) had elaborately delved upon mangroves in eastern and southern Australia giving an elaborate account of the flora and fauna and the relationship between mangrove forests and fisheries in the Indo-West Pacific region. Backer & van Steenis (1951) had worked upon the flora of Malaysia and published an important Monograph on Sonneratiaceae. Saengar (1979) published his results of research on morphological and reproductive adaptations of Australian mangroves. Saenger *et al.* (1983) had brought out an important publication on the global status of mangrove ecosystem published by the IUCN. Aksornkoae (1980, 1985, 2000) had worked upon the distribution, growth and survival of seedlings of mangroves in Thailand, along with regular emphasis on conservation of mangroves for sustainable use stressing upon policies and management practices in the context of Thailand. Blasco (1984) researched on the climatic factors and the biology of mangrove plants. Clough (1982, 1985 & 1986) had worked upon photosynthesis of mangroves and factors regulating primary productivity of mangroves in the context of Australia. Ong (1982, 1993 & 1995) had researched on aquaculture, forestry and conservation of Malaysian mangroves. Bunt (1986) highlighted the Australian mangroves in his Country Report. The FAO Report (1988) on the worldwide compendium of mangroves associated species of economic importance is a very important publication in the field of mangrove studies. Hutchings & Saenger (1987) published the ecology of mangroves based on their research on Australian mangroves. Farnsworth *et al.*, (1996) have extensively worked on ecological responses of mangrove seedlings and growth, architecture, anatomy, physiology, foliar chemistry and reproduction of red mangrove *Rhizophora mangle.* Gong & Ong (1990) published their results of research on plant biomass and nutrient flux in a managed mangrove forest in Malaysia. Simpson *et al.* (1997) also worked on determination of Net Fluxes from mangrove estuary system. Uncles *et al.* (1992) worked on the intra-tidal fluctuations in stratification within a mangrove estuary. Turner *et al.* (1992) had worked upon the dynamics of Pantai Acheh Forest Reserve, an area badly devastated by the recent Tsunami. Qureshi (1990) had worked on the issue of experimental plantation for rehabilitation of mangrove forests in Pakistan. Siddiqi (1979, 1996, 1997, 1999 & 2002) has extensively worked on plantation techniques and regeneration problems in mangrove afforestation programmes undertaken in the Sundarbans of Bangladesh.

Mangrove vegetation – an important links for maintaining the coastal ecosystem

Mangroves are unique ecological features which are facultative halophytes that are found all over tropical swampy coastal lands and islands, fringed with saline water creeks, canals and estuarine environments. Where conditions are favorable these vegetation may form extensive and productive forests in the sheltered coastline. Mangrove ecosystems are reservoirs of species of flora and fauna associated together over a long evolutionary time. This very specialized vegetation not only dominate the habitat and characterize the ecology, but also define an economic resource, which has been widely used by the coastal people of the tropics since centuries. Mangrove vegetation stabilizes the coastal shoreline render protection to the landmass from tidal surges, cyclonic storms and very high wind velocity. Mangrove ecosystems are economically significant and commercially very important for their forestry products for firewood, charcoal, tannins, dyes, timber, boats to honey, wax, reptile skins, cigarette paper, alcohol even brown sugar.

Mangrove forests and marshes are inhabited by innumerable taxa of invertebrate and vertebrate fauna, micro and macro, illustrating the high productivity of the ecosystem. The mangrove ecosystem within sheltered estuary gets the decomposers from both marine as well as upstream sources, the mineral supply similarly comes from both sources. The system is enriched by nutrient recycling due to diurnal tidal effects. The primary contribution is made through mangrove litters. The litters break down in to consumable form by bacteria fungal decomposers, which attract the post larval shrimps and prawn from miogeosniclinal high seas to estuarine mangrove nursery. Both types of fishery, in shore and offshore, are ultimately dependent upon a common resource sustained by the estuarine mangrove ecosystem which including large areas of backwaters and lagoons are recognized as world's most potential nursery.

The mangroves are circumtropical in distribution; their greatest luxuriance is in the Indo-Pacific region, where their greatest diversity is met with. The mangroves of India, as part of Indo-Pacific are therefore, noteworthy for their beauty, luxuriance and diversity. They have not received adequate attention at all. Mangrove swamps have highest productivity need research for ensuring their regeneration and sustained yield. Till now our surveys of the mangrove areas are far from adequate. Due to immense biotic interference and multiple uses of mangrove vegetation, these resources are threatened with great destruction, in south east Asia and in India in particular, there is severe pressure for the conversion of mangroves to agriculture, industries, aquaculture and upstream river-water diversions for irrigation and other purposes. These factors are severely disturbing mangrove ecosystems by diminishing fresh water inflows, increasing soil salinity and interfering with nutrient supply.

The important role played by plants including algae and halophytes with special reference to mangrove forests and swamps in the production of detritus, dissolved organic matter and relying of nutrients is being increasingly realized.

Physiology, biochemistry of some Mangrove plants

Halophytes are such palnts, which complete their life cycle in an environment, which has a high salt content and may be contrasted with glycophytes, which are plants that are sensitive to such high salt levels. Mangroves are classed as halophytes as they are trees and shrubs that grow primarily in saline habitats. But it does not mean that these mangroves require salt for successful growth and most mangroves probably grow reasonably well in fresh water. In fact, it has been suggested by Snedaker (1979) that fresh water is a physiological requirement and salt water is an ecological requirement. The former prevents excess respiratory losses and the latter prevents invasion and competition of non-halophytes. Therefore, we can assume that most of the mangroves are not obligate halophytes. They complete their entire life cycle and compete successfully with other plants in saline environments. Genkel and Fane (1958) nicely classified halophytes as (1) *Euhalophytes* (salt accumulating), (2) *Crynohalophytes* (salt excreting), (3) *Glycophytes* (salt impermeable), (4) those in which salt is localized in special structures.

Depending on species, mangrove may be placed in (1), (2) or (4). It is doubtful that mangroves are intolerant or obligate halophytes, though Stern and Voight (1959) and Connor (1969) have shown that *R. mangale* and *A. marina* grow very well when salt is present in the soil water. Some mangroves (*i.e.*, *R. mangale, C. tagal, N. fruticans*) adapt to glycophytic conditions and may be considered to be facultative halophytes. Mangrove species have been reared in fresh water in the laboratory and Stocker (1924) proposed the term "miohalophytes" for such mangroves. Davis (1940), and Stern and Voight (1959) showed that *R. mangale* grew and reproduced in fresh water, but their growth was not up to the mark of brackish water.

Winkler (1931) reported that *Bruguieria* and *R. mangale* flowered in pots in sand culture with normal water irrigation. Bal & Butt (1990) also observed that *R. mucronata, B. gymnorrhiza, Av. marina, Av. officinalis, Ceriops decandra* and *Aegiceras corniculatus* grew under normal soil condition in the pots and irrigated with normal water, they all flowered and produced fruits and all the fruits germinated. Stern and Voight (1959) observed that height, dry weight and survival of *R. mangale* increased with increasing salinity in the laboratory. They used artificial seawater, and plant dry weight was approximately three times in the highest salinity than in the lowest. Maximum growth was observed at salt concentration equivalent to seawater. Patil (1964) grew *R. mucronata, K. candel, B. parviflora, C. tagal, Acanthus ilicifolius, Xylocarpus moluccensis, Ex. agallocha* and *Heretiera fomes* in salt concentration between 0.3 and 1.2%. It was noticed that all species grew in all salinities but growth performance was best at 1.2%. Clarke & Hannon (1970) found that *Av. marina* at the two-leaf stage maintained optimal growth in 20% seawater. Concentration above 60% seawater retarded growth. Seedlings at the 2-4-leaf stage were more tolerant and optimal growth occurred at 40% seawater. Connor (1969) reported that the optimal concentration for laboratory growth of *Av. marina* was approximately 1.5% of half the concentration of seawater. Connor also reported that suppression of height by higher salt concentration was more marked than suppression of dry weight production. Connors suggest that high concentration of Calcium caused nutrient imbalance leading to iron deficiency and speculated that the responses of mangroves to specific ions reflect the physiological ability of mangroves to adapt to concentration of the root environment.

Bharucha and Navalkar (1942) reported that the chloride concentration of leaf cell sap of *A. alba* in relation to that of sea water and soil salinity. They concluded that seasonal variation in the chloride content of leaf cell sap were dependent directly on climatic condition of temperature, rain fall, and humidity. It is assumed that such high sap concentration is common in mangroves that posses' glands for salt excretion.

Blum (1941) observed that osmotic pressure in leaves of several mangroves Avicennia had the highest osmotic pressure, where as Rhizophora, Bruguiera and Sonneratia genera which possess salt exclusion or dilution mechanisms, was having relatively low osmotic pressures.

Walter & Steiner (1936) also had shown that osmotic potential of ocean water was -2300 KPa where as leaves cell sap and root osmotic potential of different mangrove species were higher than that of seawater.

The physiology of the roots of mangroves has received relatively little attention. Scholander (1966) experimented with *Av. marina* and described that this mangrove only partially excludes salt at its roots but it is capable of excreting large quantities of salt from its leaves. The xylem sap concentration for *Avicennia* is stated as being 10-20% of the NaCl present in seawater. Chapman (1944) stated that once a seedling of *Avicennia* becomes rooted there is a sharp increase in Cl^- content and that this is followed by a fall in the values found in adult tissues. The distribution of NaCl between root, stem and leaves were 1:0.8:2.4 when the level of salt in the plant was at maximum. It is felt that seed lings must have a remarkable capacity to absorb salt with out damage to tissues.

Bal and Dutt (1984, 1986 & 1987) worked on 13 spp. of mangroves and its associates and reported that twelve spp. of mangroves *viz. Acanthus ilicifolius, Aegiceras corniculatus, Avicennia alba, Avicennia marina, Avicennia officinalis, Bruguiera gymnorhiza, Bruguiera parviflora, Ceriops tagal, Heritiera fomes, Kandelia candel, Lumnizera racemosa, Sonneratia apetalam.* 24 species were collected from deep forest of Sunderban islands. The anatomical studies revealed that out of these twelve species only five species viz. *Acanthus ilicifolius, Aegiceras corniculatus, Avicennia Alba, Avicennia marina,* and *Avicennia officinalis* possess salt glands. These glands have been considered to be very efficient devices for excretion of excess toxic salts, which accumulate in the tissues. Further elaborate experiment conducted on *Acanthus illicifolius* on various salinity levels showed that the excreted materials on the adaxial leaf surface were sodium and chloride followed by potassium, magnesium and calcium while carbonates and bicarbonates were absent, it was noticed that, sodium and chloride excretion increased gradually with the increase in soil salinity but potassium, calcium and magnesium there was not much increase over control though there was lot of variations among these cations.

There are also reports that some times organic substances are also secreted through these glands. Recently Saunders (1958) found that pectin material was present in the secretion from the glands of Tamarix and Waisel (1970) have reported the presence of organic materials including amono acids and proteins in the secretion of *Aeluropus* species. It was observed that the salt gland of these mangrove species was present only on the adaxial surface of the leaves. The pore diameter of these glands varied from species to species. They also noticed that frequency distribution salt glands are highly variable. Maximum frequency of distribution was observed in *Avicennia officinalis* and minimum in *Avicennia marina*. Among these five species pore diameter was largest in *Aegiceras corniculatus* followed by *Avicennia marina, Avicennia alba, Avicennia officinalis* and *Acanthus ilicifolius*. Each salt gland is surrounded by a number cells which are known as collecting cells. The number of these cells varies from species to species. The number of collecting cells as observed by the epidermal peel method in *Avicennia* species 6-8, *Acanthus ilicifolius* – 6 and in *Aegiceras corniculatus* 7-8. The collecting cells accumulate small vesicles of salt through large plasmodesmata (Anderson, 1974). The absence of salt glands in the other seven species suggests the possibility of a highly effective ultra filtration mechanism in their root system to satisfactorily restrain the toxic elements from entering the plant system. Schooner *et al.* (1975) showed that the plant *Rhizophore* mangle has a more effective salt exclusion system than *Avicennia nitida* which has also supplementary salt excretion apparatus (salt gland).

Studies also revealed that four species viz. *Avicennia alba, Avicennia marina, Avicennia officinalis* and *Heritiera fomes* have sunken stomata a common xerophytic character. Due to the sunken nature of stomata these species have a lower transpiration rate. In *Sonneratia apetala* and *Luminitzera racemosa* stomata are present on both adaxial and abaxial surface of the leaves, where as other six spp. have stomata only on abaxial surface to minimize the rate of transpiration. Frequency of stomata is highly variable among the species. Highest frequency of stomata was observed in case of *Acanthus ilicifolius* and lowest was in *Ceriops tagal*. The sunken nature of stomata and a lower frequency of distribution in the leaves of plants growing in saline media prevent the plant from losing excessive water due to transpiration, with out affecting the photosynthetic efficiency (Gill and Dutt, 1982).

Bal & Dutt (1984) observed that on the abaxial surface of the leaves in *Heritiera* only, numerous star-shaped lepidote structures are present. These structures are attached at its center with the leaf epidermis around the stomata pits. The arms of these structures cover the stomata pits. In this way probably they are able to efficiently reduce the transpiration rate. These structures can be easily removed from the adaxial leaf surface by scraping.

Porteresia coarctata is an Asian wild rice species, occurring mostly in the mangrove areas of Sunderban Island in India. This mangrove associate species is highly salt resistant and can survive even up to ECe 30 to 40 dSm^{-1} (Bal & Dutt, 1986). The plant grows up to a height of 1 m with very hard stem and thick leathery leaves. The leaves are with out any midrib, which is not generally observed in other *Oryza* species. The leaf blade of *Oryza coarctata* has a number of prominent ridges and furrows running longitudinally on the adaxial surface. It is a tetraploid species with $2n=48$ chromosomes. Bal (1974) showed that this species has very high amino acid content, which is higher than cultivated rice varieties. Their further systematic anatomical studies revealed that the leaf of *O. coarctata* possesses some special unicellular salt hairs (trichomes). These special unicellular structures are found in the furrows and are connected with the epidermal cells. Arisz et al. using Limonium latifolium carried out the first important study on physiology of salt excretion. They showed that sodium chloride could be secreted against a concentration gradient and that the process was temperature sensitive and required oxygen.

It was clear from the transverse section that *P. coarctata* leaves have many ridges and furrows and each ridge contains one small vascular towards the adaxial surface and below it larger one, which confirms the report by Tateoka (1963). Both the adaxial and abaxial leaf epidermis are composed of short and long cells in rows. It was observed that the salt hairs are thin and small with blunt tips, not balloon shaped as found in *Atriplex* spp. The unicellular cells function only for a short period, when the optimum concentration of salts is reached within these cells (salt hairs) they burst and eliminate the salts. New cells are formed continuously in place of the busted cells and through this process they efficiently maintain a low concentration of toxic salts in the tissue as reported by Lewis (1970). As we have already discussed many halophytes and mangroves have salt glands, but these glands do not burst like the salt hairs of this species. Bal and Dutt (1986) also analyzed the excreted materials on the leaf surface of *Porteresia coarctata* and found that the sodium and chloride were the dominant ions same as in the *A. officinalis* experiment. With the increase in soil salinity sodium, magnesium and chloride excretion increased. Maximum excretion of sodium and chloride was observed at the soil salinity level of 31.7 dSm^{-1}. However, there were no changes in concentration of excreted potassium and calcium ion with the increase in soil salinity. It might be that potassium is most essential for their better survival and growth under salinity stress. But potassium excretion was more than calcium; the reason may be due to less uptake of calcium from the soil system.

There were no differences in sodium, potassium, calcium and chloride content in tissue of *Porteresia coarcatata* under different salinity stress; it's probably due to their salt excretion mechanism. They possibly maintain the mineral concentration in their tissues according to their requirement. Their work also proved that *Porteresia coarctata* very efficiently maintained a lower chloride concentration in leaf than stem. Salcium content was also lower in the leaf than stem. The accumulation of calcium was much lower than other elements.

It was clear from Table – that moisture status of the leaf tissue did not change with the increase in soil salinity. Similarly, there was also not much change in osmotic potential of leaf sap except at 31.7 dSm^{-1} (ECe), where it was slightly increased; this increment may have been due to the higher concentration of organic solutes in the tissues. It was interestingly noted that with the increase in soil salinity total biomass production increased markedly over control but this increment was maximum at (ECe) 8.1 dSm^{-1}, which was 65.0% over control. This study indicated that probably *Porteresia coarctata* does not feel any stress even under higher salinity levels due to their unique salt hairs by which they efficiently excrete the excess amount of toxic elements.

Joshi's school has carried out elaborate studies on salt regulation in several mangrove species showing salt regulation spread over different seasons. Some of their ion accumulation patterns are summarized in Table 3. Not much work was observed in the literature on the Na^+, K^+, and Cl^-, concentrations in the xylem sap of a mangrove. Atkinson *et al.* (1966) gave a value for *Aegialitis* of 122 mM Cl^-, 118 mM Na^+ and 14 mM K^+. Joshi *et al.* (1975) gave good evidence that there must be an effective uptake mechanism for K^+ ions in most of the mangrove species. It is interesting to speculate that in some species the K^+ ion may dominate over the Na^+ ion in the xylem sap. Scholander states a figure of 20 to 26 mM Cl^- in the xylem sap of *Rhizophora*, and Atkinson gave a figure of 17 mM.

Kumudranjan Naskar (1972)
[He is no longer with us, since 2014]

Down the Memory Lane – a journey through flowers and foliage

It was a dream come true when our names appeared in the first year admission list of M.Sc. (Botany) in the 'Day'' list in 1972 for study of post graduate course in Botany (Calcutta University) in posh South Calcutta Campus popularly known as Ballygunge Science College.

Soon after the admission formalities were over, we came to Department of Botany, Ballygunge Science College for our classes. The quiet and serene atmosphere in the department compared to hustle and bustle at the Calcutta University campus in College Street made us both nervous as well as very much at home. To our pleasant surprise, lecture rooms and laboratories were very neat and tidy. Slowly and gradually we got introduced to senior professors like Professor H.C. Ganguly, Professor A.K. Ghosh, Professor Arun Kumar Sharma, Professor Archana Sharma and other Professors like Prafulla Chandra Dutta, Rabin Purkayastha, Prabir Kumar Chatterjee, Subhas Chandra Dutta, Nirmalendu Samajpati, Ashish Kumar Chandra, Prasanta Kumar Sarkar, Subhendu Mukherji, Sumitra Sen, Sibdas Ghosh, Satyesh Chandra Roy and Rajat Kanti Chowdhuri. Soon it was time to visit the library, where librarian Shri Priyanath Babu was ever helpful with a smile to enable us to lay our hands on a few copies of books for preparing notes. On the administrative side, Shri Panchu Gopal Chatterjee and Shri Chapala Kanta Sur (Panchuda and Chapalada as they were popularly known) were always there for the students with a smiling face to help them with all kinds of administrative nuances.

Very early into the first semester, we were asked to make our choice for the special paper and we chose specialization in Cytology and Genetics as it was our dream to study special paper under the guidance of Professor Arun Kumar Sharma and Professor Archana Sharma. We always eagerly awaited Professor Arun Kumar Sharma's lectures as his deep understanding of topics and delivery skill used to create a magic web leaving us spellbound. Hardly anyone moved during the lectures as we used to listen with rapt attention as the erudite and effusive Professor Sharma moved from one topic to another. The lectures were loaded with updated developments in cytology and genetics, which at times were used to find it difficult to even locate in the books or journals. Professor A.K. Sharma's lecture on DNA double helix model by Watson and Crick and pioneer work by Dr. Hargobind Khorana on Genetic Code was mesmerizing and we felt a sigh of relief when he mentioned that we can refer to the book 'Gene and the Genetic code' by Cheryle for further details in the matter. All these memories are fresh in our mind even today though more than 4 decades old. The extempore scintillating lectures of Prof. A.K. Sharma were always a treat for our knowledge hungry minds. On the other hand, the affable Prof. Mrs. Archana Sharma kept us engrossed in her lectures on chromosome techniques and its application in identifying genetic traits of various members of the plant kingdom. The lectures by other teachers gave us insight into the various branches of Botany and periodical semester examinations helped us identify our strengths and weaknesses to enable us to prepare better for the next semester. It was always a race against time during which we had the pleasure to participate in numerous seminar/symposia, excursions and organize annual reunion of the department as well.

During our two-year stay in the Department from 1972-74 we always felt part of a large affectionate family of teachers, whose dedication and compassion has made us what we are today. Those were the best years of our life, though anxiety about future, performance in semesters etc. used to bother everyone, yet all the pressure was well managed by the continuous support of the excellent learning system in the department.

This write-up down the memory lane will be incomplete without mention of great logistic support provided by the ground staff especially Dhari and Duryodhan, the father and son duo who very affectionately tended the garden and the glass house to make plant samples available for study and research.

Prem Kumar Gajra and Bani Gajra
Alumnus, 1974

A journey with batchmates

We graduated with Botany Honours during the fag end of the Naxalite Movement in West Bengal. We were an exceptional group with 8 of us getting 1st Class in Honours [in those days the number of 1st class restricted to 1 or 2]. Out first day in Science College was a memorable one with the legendary Professor A.K. Sharma initiating us to postgraduate study and saying that there was no farewell from this Department since we are now a part of the big family of Botany. This was thought provoking because we got farewell from school, from college but now we are in an arena of continuity.

We completed M.Sc. within 18 months [in 1979] through 5 semesters, which partly compensated the year lost in B.Sc. For this reason we often make the vital mistake to the question 'which batch are you?' and answer 1979 instead of 1978. The number of 1st Class nearly tripled. We were a cohesive, active group with very strong opinions. The year we organized the reunion West Bengal was flooded. We had to curtail the function to a single day and set the trend till date. Then we were in 3rd term when Sir & Didi took our classes. There was no escape from class on the ground of fund collection. So we did practical in the morning and after theory went hunting. The reunion showed the caliber of this batch where prizes were announced for fabulous decorations (Bratati, Supriti, Tapati), becoming runners up in Bridge competition (Bhaswati, Sumona), wonderful dance drama with the lead dancer (Mahua) and singer (Partha) going on in life to make a name for themselves as successful artists and of course the hilarious play where the actor (Kashinath) fell before the gun could be fired. By the time we completed M.Sc. six of our batchmates formed life-long partnerships (Anju-Arup, Mukti-Partha, Rama-Sanat).

Although this brief note is about our batch I can't resist the urge to write a few words of our Lab-mates. I spent 12 years in the Chromosome Research Lab II (as JRF, SRF and RA). Our Lab would throb with work with us lining up to use the microscopes, waiting for the green signal from Sumitradi for karyotyping. Our seniors (Bina, Bithika, Nirmalya, Sandip, Sangram, Suchitra, Jose), we (Anita, Anjana, Manju, Nagesh, Shyamal, Sumona) and the juniors (Dipayan, Madhumita, Kalpana, Mithu, Ajoy, Sudipta, Partho) interacted closely. Nirmalyada, Sangramda and Anita have become University Professors, Suchitradi, Anjana and Ajoy have become Scientists of highest rank, Nagesh and Mithu have settled abroad Bithikadi and Manju have become school teachers and the rest are teaching in colleges. The uniqueness of this Batch of 1976-1978 can be gauged by the brief detail of their progress given below.

1. Anita Mukherjee (anitamukherjee28@gmail.com), Ph.D. at CU Professor & former HOD of Botany CU & former HOD of Genetics, CU. Research in Genetic Toxicology INSA visiting scientist ATRI, Korea Atomic Research Institute, Jeongeup, Korea, 2011. Tie-ups with **Dr. A.K. Giri**, IICB, Kolkata, **Dr. T. Gichner**, UEB, Prague, Cz., **Dr. Jin Kyu Kim**, Radiation Biologist, Korea Atomic Energy Research Institute (KAERI), Advanced Radiation Technology Institute, Seoul, Korea. **Dr. Lal C Ram**, Environmental Management Division, Central Institute of Mining and Fuel Research (CSIR). **Dr. Olajire Aremu Adegoke**, Department of Pharmaceutical Chemistry, University of Ibedan, Nigeria
2. Anju Seigal (Gooptu). Self employed. Business
3. Anup Mandal, B.Ed. Assistant Teacher in Dhannyakuria High School. Author of two books, one on poetry
4. Aparajita Chatterjee, Assistant Teacher in Pathabhavan School
5. Aruna Mehta (Khemka), B.Ed.Assistant Teacher in a Hindi medium school in Kolkata
6. Arup Gooptu (agooptu@yahoo.com), MBA. General manager, Eastern Coalfields
7. Ashalata D'Rozario (ashalatarozario@rediffmail.com), Ph.D. at CU. Associate Professor at Narsingh Dutt College, Guest faculty in Postgraduate Departments of Scottish Church College, Bethune College & CU. Recipient of CAS-TWAS Visiting Scholarship award in 2006, 2009, 2011 at Institute of Botany, Chinese Academy of Sciences, Beijing, to work on Permo-Carboniferous flora of China and its palaeogeographic implications. Attended many National & International Conferences in India & abroad
8. Bhaswati Bhattacharya, Ph.D. at CU Coaching school students at home.
9. Bidisha Ganguly (bidishachaterji@gamil.com), Head of Department of Biology; Delhi Public School (DPS); Ranchi Assistant Head Examiner in CBSE Board (AISSE & AISSCE). In-charge of all science practical examination for Grades IX-XII. Represented DPS Ranchi in State-level and National-level Science Congress, Quiz Master for Inter DPS Quiz, Ranchi Award from DPS Ranchi for completion of over 20 years of dedicated

service (2012), Award from Science Congress Society for being the DPS Ranchi lead teacher in Science Congress (thrice), Award from Tata Group for being the DPS Ranchi lead teacher in Green Olympiad: for "Fostering ecological awareness among high school students"

10. Bratati De (bratatide@hotmail.com), State Scholar Ph.D. from King's College London, University of London. Professor & former HOD, Dept. of Botany, CU. Recipient of Endeavour Executive Award by Australian Government in 2008. Selected as visiting faculty for short term Assignment (28 days) & visited Yangon University, Myanmar for conducting seminars/lectures/training to Ph.D. scholars under a M.O.U. signed between Ministry of External Affairs, Government of India, Union of Myanmar & Educational Consultants India Limited in 2004. Member, Metabolomics Society, Fellow, Indian Association of Biological Sciences, Life Member, Indian Science News Association, Life Member, Indian Science Congress Association

11. Chaitali Dasgupta (SenGupta), Ph.D. at CU. Life Science Teacher at St. Stephen's School, Kolkata

12. Debasis Jana, Ph.D. at CU. Associate Professor at Jiagunj College

13. Debjani Adhikari, Ph.D. at CU. Coaching undergraduate students in Kolkata

14. Dipika Mitra, Assistant Teacher in a school

15. Kashinath Bhattacharya (Kashinathb23@rediffmail.com), Ph.D. at Bose Institute. Professor & HOD in Botany, Visva Bharati. Elected President of The Indian Aerobiological Society, 2012-2014, Fellow of the West Bengal Academy of Science & Technology, Fellow of the Indian College of Allergy & Applied Immunology, Fellow of the Indian Aerobiological Society, Elected Member of the Environmental Sciences, Sectional Committee of the 101st Indian Science Congress for 2013-2014, Core Member, GEO Task US09-01a, Earth Observation Priorities for Human Health, Aeroallergens SBA (Sonsored by NASA), Group Leader, Hillel Koren, University of North Carolina, USA, Member, INDSUBIO (Indian Sub-Continent Biomization) Project of IGBP (International Geosphere Biosphere Programme) headed by Prof. Sandy Harrison, Bristol University, U.K.

16. Kunal Sen (Botanysen56@gmail.com), Ph.D. at Bose Institute. Associate Professor in West Bengal Higher Education Service & HOD in Bidhannagar College Member of

UGBOS of UBSU, Author of several school Bengali text books in Life Science & in Botany for undergraduate general students, Treasurer of All Bengal Government College Teachers Association

17. Mahua Chakraborty (Mukherjee) (gaudiyamahua@yahoo.com), Ph.D. at CU. Dean, Faculty of Fine Arts, Rabindra Bharati University & Director, Centre for Studies in Dance forms of Bengal, RBU. Also taught Botany at BKC College, CU. Awarded Best Women Achiever award on Gaudiya Nritya by FICCI [2008-2009 Silver Jubilee], Best Speaker Award on Dance from Sree Mata Vaishno Devi University, Jammu & Kashmir, on celebration of 150 years of Tagore 2011-2012, Gold Medal in Dance from Prayag Sangeet Samity. Recognized as a Guru of Gaudiya Nritya in Guru-Shishya Parampara Scheme of EZCC, Deptt. of Culture, Govt. of India. More than 50 disciples have received National Scholarship and Fellowship from Ministry of Culture, Govt. of India, Fulbright Fellow, Govt. of USA, and worked as a Visiting Professor & Researcher in Oklahoma University, USA, 2004-2005, Author of Twelve books on dance, Documentary films on research work in revival of GAUDIYA NRITYA.

18. Manisha Guha. State Bank of Indore

19. Mukti Bhattacharya (Banerjee) (muktiskitchen@gamil.com), Ph.D. at CU. Established Mukti's Kitchen (www.muktiskitchen.com) an interactive Indian cooking class business in US. For twenty years, worked in cutting-edge areas of molecular biology and genetics at a number of reputed research and health care organizations in Illinois and New York

20. P. Nagesh Rao, Ph.D. at University of Notre Dame, Indiana Clinical Professor, UCLA, Dept. of Pathology & Lab. Medicine & Pediatrics, Chief, Clinical & Molecular Cytogenetics Laboratories, Co-Director, Clinical Microarray Core Lab., Consulting Clinical Cytogeneticist, West LA VA Hospital Member of Subcommittee on Fluorescent In Situ hybridization (FISH), Methods for Medical Genetics, Clinical & Laboratory Standards Institute. Founding Fellow, American College of Medical Genetics, AAAS, Sigma XI, American Society of Human Genetics, International Cytogenetics & Genome Society & Associate member of European Cytogenetics Association, **Ad Hoc reviewer of JAMA**, Genomics, Am. Jour. Medical Genetics, Am. Jour. Human Genetics, Journal of Medical Genetics, Pediatrics Blood & Cancer, Journal of Molecular Diagnostics, Int. Journal of Cancer, Journal of Fertility & Sterility, Genetics in Medicine

21. Partha Banerjee (Banerjee2000@hotmail.com), Ph.D. at Southern Illinois University + MS in journalism from Columbia University. Was HOD of Sunderbans Haji Desarat College, now in Brooklyn & focused on the economics & human rights aspects, labor education, Indian music & literature. Working in the areas of human rights, immigration and media
22. Prasanta Sen, Ph.D. at CU. Associate Professor & HOD of Botany in Bankim Sardar College
23. Pratap Mitra (Pkmitra54@gamil.com). Consultant in Boston Scientific & Involution Med Systems. Retired from Johnson & Johnson as Country Manager in Bangladesh. Teaching Medical Representatives as well as Doctors
24. Priti Roy (Bose) (pritiroy@hotmail.com). RECE (Registered Early Childhood Educator) Program Facilitator/trainer Chair: Association of Early Childhood, Educators Ontario (AECEO) Peel Branch
25. Rama Ghosh (Dey Rao), Ph.D. at CU. Affiliated with SUNY at Buffalo as Research Scientist in the Dept. of Dermatology + Clinical Assistant Professor in Biotechnical & Clinical laboratory Sciences teaching Bioinformatics & Molecular Biology, Initiating & implementing an innovative education program at High School level in Western New York aiming to keep students interested in STEM. Now a curriculum at the undergraduate & graduate level. http://medicine.buffalo.edu/news_and_events/news/2011.
26. Sakuntala Chatterjee (Bhaduri), Ph.D. at Bose Institute. Associate Professor & HOD of Botany in Rammohan College
27. Sanat Kr Dey, MBA Niagara University, USA. Passed away.
28. Shyamal K. Chakraborty, Ph.D. at CU. Associate Professor in West Bengal Higher Education Service, Formerly HOD of Botany in Bidhannagar College, Vice President of West Bengal Government College Teachers Association
29. Sk. Ramjan, Headmaster of a School in Krishnanagar
30. Sumona Mukherjee (Sumona.mukherjee13@gmail.com), Ph.D. at CU. Associate Professor in West Bengal Higher Education Service. Initiated Postgraduate Teaching in Bethune College, Associated with Jagadish Bose National Science Talent Search, PSC. Elected

Fellow of Indian Botanical Society (FBS). Life Member, ISCA, IBS, PCMFRCB, CCSHWRD & Alumnae

31. Supriti Rani Dutta, Ph.D. at CU, Associate Professor in Rishi Bankim College & HOD of Botany. Painting exhibition
32. Swapna Banik, Ph.D. at Bose Institute. Associate Professor & HOD of Botany in Basirhat College. Member of UGBOS of UBSU
33. Tapati Das, Teaching in a school.
34. Tapati Datta, Ph.D. from Germany. Settled in Europe

Sumana Mukherjee (1978)

Down the Memory Lane

Calcutta, September, 1975: For the first time I came to Calcutta and met my most revered teacher, Professor A.K. Sharma. I was in Calcutta to apply for a CSIR fellowship through him. I had made a picture of him in my mind as a stalwart in the field of chromosome research, I have sought his permission to enter into his room and got a very affectionate reply, 'Yes, come in'. I was welcomed with an innocent and unforgettable smile. My God, I felt relieved. But, while discussing technical details, he came to know that my specialization at M.Sc. was Plant Pathology. I saw a change in his face and thought my candidature might be rejected right now. I immediately stood up and told with folded hands, 'Sir, I have a desire to do Ph.D. under you'. 'Sir' soon realized my nervousness and told 'alright, alright, you will learn it'. Thus began my days in his cytogenetics lab.

I was in the department from 1976-1980. It was the peak period as far as academic activities of this department were concerned. All the laboratories were actively engaged in research works, and all projects were sponsored by various funding agencies. Chromosome Research laboratory (CRL) comprised half of the huge department of Botany with a large number of research students working on various problems of plant cytology, genetics, genotoxicity, tissue culture, human genetics, molecular biology and a number of other related fields. This was the period when the University Grants Commission, New Delhi, elevated the department to the Centre of Advanced Study with a focus on Cell and Chromosome Research.

This was the period when students and young teachers from different parts of the country, from Kashmir to Kerala, worked for their Ph.D. degrees in the Cell and Chromosome Research Centre. We were trained variously in different disciplines of research, such as, proof correction to learning economy in using chemicals, etc.

There was a unique practice in our laboratory. There were some rules and breaking them invited a fine from 0.25 paisa to Rs.5/- if there is violation on instrument or chemical usage. And, rules were applied to every student and even to 'Sir'.

The Cell and Chromosome Research Center had a grant under Indo-British collaboration programme, and the lab was tagged to Universities of London, Oxford and also to University of Nottingham. Stalwarts like Prof. E.A. Bevan of London University, a known microbiologist of the time, Prof. C.G. Vosa, Cytogeneticist of Oxford University, Prof.

E.C. Cocking of Nottingham University; a pioneer of protoplast fusion and of other researchers visited the CRL benefitting the students and the teachers alike. Teachers of the department too visited these Universities in the exchange programme. This was the period when every year at least two to three national or international symposia were being organized. Scientists from abroad, to name a few, W.S. Flory (USA), W. Gottschalk (Germany), B.E. Wolf (Germany), A. Vaarama (Finland), A.B. DaCunha (Brazil), K. Patau (USA), T. Haga (Japan), G. Gimenez-Martin (Spain), M. Moutschen-Dahmen (Belgium), C. Pavan (S. America), H.P. Riley (USA), J. Lejeune (France), C. Barigozzi (Italy), Keith Jones (UK), V.H. Heywood (UK) and a number of reputed Indian botanists used to attend them. It was a great time for students like me participating in the process, right from receiving and seeing the guests off, even at odd hours, at railway station or at the Dum Dum Airport and also to their stay in the University Guest House (CU) or in the International Guest House of the Ramakrishna Mission Institute of Culture, Gol Park, Calcutta. Every time 'Sir' briefed us before hand about the guests and sometimes about their contributions too. When Prof. Bevan visited the Laboratory, I was asked by 'Sir' to take care of him during fifteen days of his stay in Calcutta. I was instructed to reach the Guest House exactly at 9.55 hour in the morning with a taxi ready at the gate. It used to be a very difficult task for me as it was not easy to hire a taxi at that peak hour in Calcutta. To my surprise, on every day I found Prof. Bevan ready with his bag beside and waiting for me.

One interesting story, I want to mention here. 'Sir' was in the habit of forgetting his spectacles and some of us used to come to his rescue. When those were found, respected 'didi' our Archanadi used to make a fun to him and every time, 'Sir' reciprocated her with his characteristic smile. We enjoyed those moments.

'Sir' was a tough administrator, yet very kind and highly respected by one and all. On one day, 'Sir', while passing through the corridor of the department, saw a staff smoking in the Herbarium (CUH). He came back to his chamber and the man was immediately called in. In the meanwhile, I was also called for some work. I saw the man was standing before him on one of his feet and holding both of his ears with his hands in an apologetic manner. He was immediately forgiven, but with a stern warning not to do it again. He had a unique style of chiding us, a serious face mixed with a smile, which only his students and persons close to him could feel. It was enough for us.

Story of the Department of Botany in general and the Chromosome Research Center in particular cannot be complete without remembering late Prof. Archana Sharma whom everybody addressed as 'didi'. She, too, was a tough administrator, a fine teacher, a good orator and a great scientist. She had some unique qualities to spot spelling and composition errors. She had a unique command in English, Hindi and Bengali languages. She was intelligent with God gifted qualities and with presence of mind.

I would like to remember three greet researchers of their fields, Dr. Geeta Talukder (our Geeta didi), Dr. D.K. Sen (a nephrologist at N.R. Sircar Hospital, Calcutta) and Prof. Sushil K. Mukherji (a stalwart of Chemistry and former Vice-Chancellor of Calcutta University) who were regular visitors and, directly or indirectly, part of active researches going on in the laboratory. They loved me much. I pay my heartfelt respects to their departed souls.

T.P. Singh

My experience at the Department of Botany, University of Calcutta and Texas, U.S.A.

It was a gloomy and murky night when I arrived at the Dallas Fort Worth Airport on 17th August of 1992. I was very nervous being alone in a new continent since I did not know anybody in Dallas, Texas. I only had a chance to speak to Prof. Don Smith of the University of North Texas (UNT). Internet was not available, e-mail was not a means of communication and use of mobile phones was still in the distant future. In a new unknown environment I felt that I have risked my secured life of Kolkata. I was a CSIR Fellow at the Center of Advanced Studies (CAS) in Cell and Chromosome Research of Department of Botany of the University of Calcutta, India where I left my dissertation of an unfinished Ph.D. Only the asset that I was carrying with me was the Diploma of the Masters' Degree in Botany from the University of Calcutta, India and the knowledge that I gathered from my mentors at Kolkata. I went on cursing myself for leaving the environment that had nurtured me with love and parental care. I missed my association with the research laboratory at the CAS every moment during my first year stay in the United States as I promised Prof. Amiyangshu Chatterjee that I would complete my unfinished Ph.D. at his lab.

I would not survive here, in the United States without the constant support that I received from Prof. Smith who was equally kind like my mentors in Kolkata. By the end of the December 1992 he figured out that I was running out of enthusiasm and not working hard enough towards my Doctoral research. When asked I told him that I was frustrated because I left that unfinished Ph.D. for which I already defended my thesis publicly and that was approved by the experts of the Ph.D. Committee in Kolkata. Besides that, the CSIR from New Delhi has sent me a letter asking me to join the lab to complete my research at the CAS, Botany in Kolkata. Dr. Smith read the letter and picked up the phone to call the International Office to approve a leave for two years. In the 125 years' history of the University of North Texas, I was the only international student who received a study leave to fly to India for the Doctoral research. The administrators approved the leave and I was the happiest person being able to return to my beloved lab in Kolkata. I carried some culture tubes and I declared that at the port of entry at the Kolakta airport. The customs officer stopped me and asked me to wait until Dr. Parthadev Ghosh who also received his Ph.D. in Botany from the University of Calcutta helped me to get a release on those cultures. This year (2014) I have completed my twenty-two years of teaching in Texas. In 22 years, I have taught different courses in Botany, Genetics, Plant Ecology and General Biology at the four different institutions of Texas, namely, the University of North Texas, Richland College in Dallas, South Texas Community College and West Texas A&M University. I also had my Post-Doctoral experience as a Post-Doctoral Fellow at the Baylor College of Medicine, Houston, Texas where I performed ultrastructure studies of parasympathetic innervations of the heart of $\alpha3$ deficient knockout mice using *in situ* hybridization, immune-cytochemical labeling and Transmission Electron Microscopy. I would not survive here without the training that I received from the world-renowned faculty-mentors that I had at the University of Calcutta. I was not very surprised to see that our respected Sir, Prof. A.K. Sharma and *Didi* (Prof. Archana Sharma) were well known to Dr. Smith and Dr. Gerard A. O'Donovan, the then Chair of the Department of Biological Sciences at the University of North Texas. When I teach any related topic that reminds me about how our mentors taught that topic to us and I feel proud that I had my association with the world famous faculty of the Department of Botany of the University of Calcutta, India. Sometimes I feel like I was copying them while teaching a topic in Botany. Most likely, I follow the manner how Prof. R.P. Purkayastha used to show his fingers to point the five major points in Plant Pathology or Prof. Samajpati used to teach fungi. Prof. Subhendu Mukherjee's Plant Physiology class was a fun learning. He was humorous to present many analogies to explain complicated biochemical cycles. One time he used a Manna De's (the legendary singer who just passed away) song while explaining "Photorespiration". I always remember his notations while teaching Taxonomy in my classes. Prof. Rajat Chowdhuri's Molecular Biology class was a unique one and we learned a lot on the functions of cell organelles. Prof. G.C. Mitra was able to develop my passion towards the interesting facets of Plant Anatomy. Prof. Prabir Chatterjee left an everlasting love for algae and the green world in the water. I miss him a lot. Whenever I watch the famous science fiction movie Jurassic Park, I think of Prof. Manju Banerjee who successfully inculcated the passion for Paleobotany. I still remember Prof. P.K. Mukherjee and Prof. Paria's parental care during our excursion in Nepal Himalayas and cherish the memories of those days and share that with my present students. Prof. Mukherjee became world famous for his recent discovery of a new species of a medicinal plant in the Andaman Islands.

I used to record all the lectures delivered by Professor A.K. Sharma and Professor (Mrs.) Archana Sharma (Didi) with my small cassette recorder. This valuable collection of talks helped me a lot in learning and preparing my lectures when I began teaching lecture classes at the University of North Texas in the early nineties. During my special paper in Cytogenetics, I entered into a different world on cell and chromosome research called Centre of Advanced Studies in Botany. My learning continued there till my first Ph.D. Degree for which I worked under Professor Amiyangshu Chatterjee. What I have accomplished here in the United States would not be possible without the kind help, passionate instruction and continuous inspiration from Prof. Chatterjee, Prof. Ranajit Mallick and all of my colleagues at my laboratory in CAS. *Didi*, Prof. Archana Sharma was a constant inspiration to develop my career in academia. I remember those days when Professor Amiyangshu Chatterjee had to stay with me till 11 PM or midnight to help me in capturing the micrographs to complete my Doctoral thesis under him. I enjoyed my days at the Department of Botany, spent in learning from the national and international seminars, excursions to *Sunderbans*, Nepal Himalayas, various other places and the Botanical Gardens. I continued my research on tissue culture of tree legumes, Scanning and Transmission Electron Microscopy, molecular techniques applied to plant and microbial systems. My present research involves aerobiology in developing techniques in microscopy and molecular biology to detect the allergenicity of pollen and fungal spores, assessment on VOCs using GC-Mass Spectroscopy and other techniques. I developed collaborative research with the local physicians and corporate members in diagnosis, prevention and cure for allergic rhinitis, asthma and other related ailments. At the West Texas A&M University, I teach Botany, Human Genetics, Bioinformatics, Cytotechnology and Integrated Biology courses. I also introduced a class of Study of the Medicinal Plants. My learning at Kolkata definitely helped in pursuing further research in the area of Biology. In all these classes I use my knowledge that I gathered from my respected mentors at the Department of Botany, University of Calcutta, India. The days at CAS, Botany left an everlasting memory that will persist throughout my life.

Nabarun Ghosh

Foxtail millet: A model crop with rich genetic and genomic resources for expediting bioenergy grass research

Foxtail millet (*Setaria italica* L.) is recently regarded as a tractable experimental model crop for studying functional genomics of grasses. Further its potential abiotic stress tolerance has invited much research attention and we attempted to generate genomic resources and to decipher the molecular mechanism of stress tolerance. Being the oldest domesticated crop, it has been adapted to arid and semi-arid areas of Asia, North Africa, South and North America. Further, it has one of the largest collections of cultivated as well as wild type germplasm rich with phenotypic variations and hence provides prospects for association mapping and allele-mining of elite and novel variants to be incorporated in crop improvement programs. Though our efforts have generated considerable knowledge on structural and functional genomics of foxtail millet, the release of genome sequence significantly accelerated the genomic research to a new dimension, as evidenced by large-scale development of genomic resources, development of web-based database, genome-wide association studies, genome-wide functional genomics and standardization of molecular protocols specific to foxtail millet.

Foxtail millet [*Setaria italica* (L.) P. Beauv.], the second largest cultivated millet species in the world possesses several salient attributes such as small genome (~515 Mb; 2n=2x=18), relatively lower repetitive DNA, short life-cycle, inbreeding nature, and are genetically closely related to several bioenergy grasses. These features have accentuated this crop as a tractable experimental model system for examining the architectural traits, evolutionary genomics and physiological aspects of bioenergy grass species. Noteworthy, the crop's abiotic stress tolerance, particularly towards drought and salinity could be exploited to enhance its efficacy in marker-aided breeding as well as in genetic engineering for abiotic stress tolerance. Recently, the Joint Genome Institute (JGI) of the Department of Energy, USA and BGI (formerly Beijing Genome Initiative), China has sequenced its genome and (Bennetzen *et al.* 2012; Zhang *et al.* 2012) this would accelerate the researchers worldwide in not only discerning the molecular basis of biomass production in biofuel crops and the methods to improve it, but also for the introgression of beneficial agronomically important characteristics in foxtail millet as well as in related Panicoid bioenergy grasses.

Morphology, architecture, nutritional and medicinal uses of foxtail millet

Foxtail millet is a C4 annual monocot with slender, erect, leafy stems capable of growing up to a height of 90-180 cm. It has a dense root system, with generally thin and lanky adventitious roots. The leaves are arc-broad and lack hairiness, while culms are vertical and slim with hollow internodes. It has the architecture of a distinctive domesticated plant that consists of only one stalk or a small number of tillers, and large inflorescences that mature more or less uniformly (Doust *et al.* 2009). The inflorescence is a constricted panicle that often nods at the top and looks like a spike due to its short branches. It has a relatively small generation time (up to 15 weeks) and several hundreds of seeds can be typically produced per inflorescence (Reddy *et al.* 2006). The grains are small (~2 mm in diameter), and sheathed in thin, delicate hull that can be separated without difficulty during threshing. These grains contain higher seed protein (14-16%), crude fat (5-8%) and minerals than finger millet (Dwivedi *et al.* 2012). Noteworthy, biological value of the digestible protein in foxtail millet is superior to major cereal crops such as rice and wheat as it contains seven of the eight essential amino acids (Zhang *et al.* 2007). The grains contain 2.5-fold more edible fiber than rice, and its bran contains 9.4% crude oil enriched with linoleic (66.5%) and oleic (13.0%) acids (Dwivedi *et al.* 2012), and high fiber (42.56%) (Amodou *et al.* 2011). Hence, foxtail millet is extensively used as an energy source for pregnant and nursing women, children and diabetic patients (Sema and Sarita 2002). It is also has the potential in reducing the concentration of blood glucose, serum lipids and glycosylated hemoglobin in type 2 diabetic patients (Thathola *et al.* 2010). Further, the germinated seeds of foxtail millet cultivars, especially yellow-seeded have great medicinal properties and are utilized for curing dyspepsia, celiac disease, weak digestion and abdominal food stagnancy (Lata *et al.* 2012).

Structural genomics

Structural genomics denotes the study of sequence organization in the genome, where the roles of DNA markers are inevitable in various applications such as investigating genetic diversity and phylogenetic relationships, construction of high-density genome maps, mapping of useful genes, comparative genome mapping and marker-assisted selection for crop improvement. Wang *et al.* (1998) was the first to report the RFLP markers in foxtail millet, followed by the construction of comparative genetic maps of foxtail millet and rice by Devos *et al.* (1998) using these markers. Later, Jia *et al.* (2007) demonstrated the importance of EST-derived simple sequence repeat (EST-SSR) markers in foxtail millet and constructed the first SSR-linkage map. Considering the importance of intron length polymorphic (ILP) markers in molecular breeding, we reported about 98 potential ILP markers from the EST data of dehydration- and salinity-stressed suppression subtractive hybridization (SSH) libraries, and demonstrated high level of cross-species transferability and utility of these ILP markers in germplasm characterization and in studying genomic relationships in millets and non-millets species (Gupta *et al.* 2011). Later, we constructed microsatellite-enriched library to develop around 172 novel genomic SSRs, showed its application in genetic studies and performed comparative mapping of the developed genomic SSRs onto the genomes of rice, maize and sorghum (Gupta *et al.* 2012). Similarly, from another set of microsatellite-enriched library constructed, we developed 78 SSR markers and substantiated the role of these markers in diverse genotyping applications, resolving QTLs, phylogenetic relationships and transferability in several important grass species (Gupta *et al.* 2013).

The release of foxtail millet genome sequence accelerated the structural genomics by enabling genome-wide scanning and large-scale development of markers. We used the whole genome sequence data to identify genomic SSR markers and developed a total of 15,573 SSRs. All these markers were physically mapped onto the nine chromosomes of foxtail millet and *in silico* comparative mapping were also performed between foxtail millet – sorghum, -maize and –rice chromosomes using these physically mapped microsatellite markers. Similarly, we identified 447 SSR containing ESTs (EST-SSRs) from the complete set of 66,027 EST sequences of foxtail millet. We also showed the utility of conserved-orthologous set (COS) markers in the genome analysis of foxtail millet, sorghum, maize and rice, and interestingly, the synteny analysis of eSSRs of foxtail millet, rice, maize and sorghum suggested the nested chromosome fusion frequently observed in grass genomes . Recently we have also developed ~5000 ILP markers in foxtail millet and demonstrated their utility in germplasm characterization, transferability and comparative mapping with other cereals and bioenergy grass species (Muthamilarasan *et al.* 2013, Revision submitted). The molecular markers developed in all our studies showed a higher percentage of cross-genera transferability in bioenergy grasses, which signified the importance of these markers in molecular breeding for crop improvement in bioenergy grasses.

The development of large-scale genomic and genetic resources urged the scientific community to provide a platform to the breeders, thus facilitating an unrestricted access to these genomic resources. Considering this, we constructed the Foxtail millet Marker Database (FmMDb; http://www.nipgr.res.in/foxtail.html) (Suresh *et al.* 2013). Being the first database for structural and comparative genomics in millet and bioenergy grass species, FmMDb promisingly bridges the gap between the researchers and breeders by giving free access to the molecular marker data to the breeders for validation and finding associations of these markers with the traits of their interest. Noteworthy, Mauro-Herrera *et al.* (2013) demonstrated the utility of the markers developed by Jia *et al.* (2007, 2009) and Gupta *et al.* (2012) in studying the genetic control of flowering in *Setaria* sp. Recently, Jia *et al.* (2013) had performed a genome-wide association studies, where they phenotyped 916 foxtail millet varieties under five different environments and identified 512 loci associated with 47 agronomic traits. These examples demonstrate the efficacy of DNA markers and still, we are seamlessly working towards developing the markers of all kinds to provide the breeders an option to choose a particular type of marker for molecular breeding towards crop improvement.

Functional genomics

As a drought-tolerant crop, foxtail millet has higher water use efficiency than other cereals and millets. Hence, in order to examine the genetic diversity of drought-induced oxidative stress tolerance, we screened a set of 107 foxtail millet cultivars for their dehydration tolerance on the basis of lipid peroxidation (LP) (Lata *et al.* 2011a). In this study, we demonstrated the existence of sophisticated antioxidant machinery with efficient ascorbate-glutathione pathway, which enables the crop to cope with drought-induced oxidative stress (Lata *et al.* 2011a). We also attempted to investigate the differentially expressed genes induced during drought stress using suppression-subtracted hybridization (SSH) (Lata *et al.* 2010). We identified the differentially expressed transcripts and the expression profiling using Reverse Northern and quantitative real-time PCR (qRT-PCR) showed an up regulation of 86 transcripts with 5-11 fold induction of DREB2-type proteins. DREBs (Dehydration-Responsive Element-Binding protein) are vital transcription factors (TFs) that regulate the expression of many stress-inducible genes mostly in an abscisic acid-independent manner and play a critical role in improving the abiotic stress tolerance of plants by interacting with a DRE/CRT cis-element present in the promoter region of various abiotic stress-responsive genes.

Characterization of *SiDREB2* gene evidenced a synonymous single nucleotide polymorphism (SNP) associated with dehydration tolerance at the 558th base pair (an A/G transition) in a set of 45 foxtail millet accessions. Based on this SNP an Allele-Specific Marker (ASM) for dehydration tolerance was developed and this ASM would serve as a rapid, inexpensive and more reproducible tool for genotyping, and also encourages marker-aided breeding of foxtail millet for dehydration tolerance. Further, the ASM was validated in a core set of 170 foxtail millet accessions and the regression of lipid peroxidation (LP) and relative water content (RWC) on the ASM suggested that the *SiDRWB2*-associated trait contributed to ~27% and ~20%, respectively of the total variation in LP and RWC (Lata and Prasad 2012, 2013b). These results demonstrated the importance of this QTL for dehydration tolerance. Currently, this ASM is now being used for allele mining and marker-aided breeding of foxtail millet by the Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu, India (Dr. A. Subramanian, Personal Communication). These experimental outcomes on deciphering the dehydration tolerance in foxtail millet has provided some novel insights onto the mechanistic part that occurs at molecular level and further detailed investigations are requisite in order to identify the precise complex regulatory networks in plants.

Understanding the cellular processes involved in salinity tolerance

In addition to tolerance to drought stress, foxtail millet is known for its better salt-tolerance behavior. First systematic study to identify the differentially expressed transcripts accumulated during salinity stress was conducted by us, using cDNA-AFLP and validated the transcripts through qRT-PCR. We identified about 27 non-redundant differentially expressed cDNAs which are unique to salt tolerant variety, and this represented different groups of genes involved in metabolism, cellular transport, cell signaling, transcriptional regulation, mRNA splicing, seed development and storage, etc. (Jayaraman *et al.* 2008). Then we compared the transcriptome of salinity-tolerant and sensitive foxtail millet cultivars by constructing SSH library and identified *SiNAC* (*Setaria italic* NAM, ATAF, and CUC) to be strongly upregulated during salinity stress in the tolerant cultivar. Molecular cloning and characterization of this *SiNAC* gene showed that this membrane-associated NAC family gene has a novel DNA-binding site (Puranik *et al.* 2011b) and they may function as a transcriptional activator in response to stress and developmental regulation in foxtail millet.

This NAC gene family has been emerged as an important TF in plants, which lays a vital role in biotic and abiotic stress tolerance in addition to their routine functions in orchestration of organ, fiber and secondary wall development, cell cycle control and senescence (Puranik *et al.* 2012). Hence considering the importance of NAC TFs, we conducted a genome-wide study along with expression profiling and evolutionary analysis, and identified 147 NAC proteins encoded in the foxtail millet genome (Puranik *et al.* 2013). We performed structural analysis to study the domains and the identified NAC genes were physically mapped onto the nine chromosomes of foxtail millet. The phylogenetic analysis classified *SiNAC* proteins into 11 sub-families and *in silico* comparative mapping of *SiNAC* genes onto the genome of rice, maize and sorghum showed highest ontology between foxtail millet-sorghum (~77%) and foxtail millet-maize (72%), thus supporting their close evolutionary relationship. The duplication and divergence rates (Ka/Ks) of *SiNAC* genes demonstrated that *SiNAC* gene family had strong purifying selection pressure (Ka/Ks < 1). Expression profiling carried out using qRT-PCR showed that cold stress induced relatively drastic changes in *SiNAC* transcript abundance than dehydration or salinity.

We compared the transcript profiles at different time points of dehydration and salinity stress, and interestingly, we identified a distinct set of gene in response to these stresses. It was observed that only 10% genes coincided under both the stresses, suggesting a distinct mechanism to perceive and respond to salt and dehydration-stress conditions. Our comparative analysis of transcriptional profiling under dehydration and salinity stress using the available datasets of other systems revealed that > 40% of the transcripts have not been identified in other species, highlighting the uniqueness of foxtail millet in terms of its responses to dehydration and salinity stress. Similarly, we also identified the differential expression of WD40 proteins in salinity and dehydration stress SSH library in foxtail millet (Mishra *et al.* 2012a). These WD40 proteins were identified to play a crucial role in diverse protein-protein interactions by acting as scaffolding molecules and thus assisting the proper activity of the proteins (Mishra *et al.* 2012b). The molecular cloning and characterization of *SiWD40* gene showed the protein architecture, cellular localization and most importantly a putative regulation of SiWD40 expression by dehydration responsive elements (DRE) during abiotic stress. Since genome-wide identification and expression profiling of gene families participating in abiotic stress tolerance unlocks new avenues for systematic functional analysis of respective gene family candidates, the outcome of these efforts could promisingly be applied for improvising stress adaptation in plants.

Conclusions and future perspectives

Since the declaration as a model crop for dissecting the physiological, evolutionary and architectural traits of C4 Panicoid grasses, foxtail millet has invited immense research in terms of both structural and functional genomics and the release of its genome sequence has equally accelerated the research in this neglected yet model crop. Of note, foxtail millet research has now obtained numerous scientific leads to proceed further towards crop improvement. Recently, we validated a set of housekeeping genes to identify stable internal controls for qRT-PCR analyses and reported that *Act2* and *RNA POL II* are apt controls for salinity-stress related expression analyses, whereas *EF-1á* and *RNA POLII* are suitable for dehydration-stress related expression analyses (Kumar *et al.* 2013). These findings would encourage the transcriptomics and expression profiling studies equitably. We invested our efforts in promoting foxtail millet, which was regarded initially as an orphan and neglected crop as a model system with rich genetic and genomic resources. Our attempts towards the development of genomic resources at large-scale and providing unrestricted access to the research community via web-based database would certainly accelerate molecular breeding for crop improvement. Further, the crop's potential abiotic stress tolerance has encouraged the plant research community to explore the respective molecular mechanism which would enable the generation of crops with improved stress tolerance and thus ensuring food security in the scenario of global climate change.

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(Alumnus, 1994)

রিইউনিয়নের নাটক

একথা ভাবলে বিস্মিত হতে হয় যে একটি পুরোদস্তুর অ্যাকাডেমিক স্নাতকোত্তর বিভাগে, কেবলমাত্র বাৎসরিক পুনর্মিলন উৎসবের সূত্রে একগুচ্ছ মুখ তাদের লেখাপড়া, গবেষণা, শিক্ষকতা ইত্যাদির বাইরে কেবলমাত্র নাটক নিয়েই পরিচিতি ধরে রাখতে পারছে আজ প্রায় চল্লিশ বছরের দীর্ঘ সময়কাল ধরে। এমন কি পুরোদস্তুর নাটকের দলের পক্ষেও এটা, যথেষ্ট শ্লাঘার বিষয় হবার কথা – কিন্তু কি আশ্চর্য, আমাদের এই চলা, ইংরেজি করে Journey বললে বোধ হয় আরও ভালো শোনায়, এতটাই স্বাভাবিক ভাবে বিভাগের এই বাৎসরিক অনষ্ঠানটির অঙ্গীভূত হয়ে আছে যে সেটাকে ব্যতিক্রমী ভাবারও কোন উপায় নেই ।কয়েকটি বছর ছাড়া, আমরা কিছু প্রাক্তনী-শিক্ষক ছাত্র-ছাত্রী সমাহারে—অন্ততঃ ৩৮ বছর ধরে রঙ্গাভিনয় করে আসছি। এই সময়কালে অন্ততঃ ৩০-৩২টি নাটক আমাদের বিভাগে অভিনীত হয়েছে যার সবগুলিতেই মুখ্যতঃ এই পরিচিত মুখগুলিকেই দেখতে পাওয়া গেছে। প্রায় পেশাদারি শৃঙ্খলায় 'ভালো' নাটক মঞ্চস্থ করার চেষ্টা করে এসেছি আমরা। পুনর্মিলন উৎসবের নাটকের ইতিহাস অবশ্যই চল্লিশ বছরের চেয়েও পুরানো, কিন্তু ১৯৭৬-৭৭ থেকে মুখ ও মানের যে ধারাবাহিকতা আজ অবধি বজায় আছে তা এর পূর্ববর্ত্তী সময়ের তুলনায় ভিন্নতর। আমার সঙ্গে এই বিশেষ পর্বটির যোগ দ্বিবিধ, এত বছর ধরে আমি প্রায় নিরবিচ্ছিন্ন ভাবে নির্দেশক ও অভিনেতার ভূমিকা পালন করে আসছি। একই কথা অভিনয় প্রসঙ্গে শুভেন্দুবাবুর (মুখোপাধ্যায়) ক্ষেত্রে খেটে যায়। বাকিরা ঘুরে ফিরে এটায় আছেন ওটায় নেই এই রকম হলেও দলের সবাই পুনর্মিলনের চৌম্বকটানে আজও বাঁধা পড়ে আছেন। পুরানো কালের বোম্বাইতে ফিল্ম্ স্টুডিও গুলোর বাঁধা মাইনের ডিরেক্টার থাকতো যাদের বলা হত 'হাউস ডিরেক্টর'। আমি হলাম এই উদ্ভিদবিদ্যা বিভাগের 'হাউস ডিরেক্টর'। মনে হল, অ্যাকাডেমিক পরিমন্ডলে, বিদ্যাচর্চার পাশাপাশি আমরা যেভাবে থিয়েটারের চর্চা করতাম এবং তাতে যেভাবে আমাদের শিক্ষক ও শিক্ষাকর্মীদের প্রশ্রয় পেতাম তা আমাদের 'কেজো' পড়াশুনার যুগে জানিয়ে যাওয়ার একটা দায় আমার থেকেই যায়। সেই তাগিদেই এই লেখা। সাল, তারিখ মিলিয়ে বলা অসম্ভব, স্মৃতি প্রতারণা করতে পারে, কিন্তু নাটক ও নাটকের পিছনে থাকা দুর্লভ মুহূর্তগুলি আজও অমলিন। এই বিভাগে ছাত্র হয়ে আসি ১৯৭৬-এ। আমরা দুই বন্ধু-আমি এবং দীপক (চক্রবর্ত্তী)-দুজনেই প্রেসিডেন্সি কলেজের দিনগুলি থেকে নাট্যচর্চার সঙ্গে যুক্ত ছিলাম। সায়েন্স কলেজে নাটকের একটা আবেদন আছে এটা জানা গেল রি-ইউনিয়নের সময়। নাটক করার সুযোগ প্রথম এলো ১৯৭৭-এ। আমার নাটক লেখার চর্চাও ছিল। রিইউনিয়ন মিটিং-এ যখন ঘোষনা করলাম-আমার লেখা নাটক করব-তখন মনে আছে হস্টেলবাসী সহপাঠীরা ক্ষুদ্ধ হয়েছিল, কেন না ওরা তখন হস্টেলে বেশ কয়েকদিন রিহার্সাল দিয়ে ফেলেছে। বললাম-সবাই করবে। নাটক ছিল, 'পটভূমি কোলকাতা'। গোটা হলটা স্টেজ। মঞ্চ এবং তাঁর বাইরে দর্শকদের মধ্যে নানা টুকরো টুকরো দৃশ্য। অডিটোরিয়াম তখন ভালই ব্যবহারযোগ্য ছিল, দোতালায় দু'টি মুখোমুখি ব্যালকনি হল ঘোষবাবু ও বোসবাবুর বাড়ির বারান্দা। দোতলা থেকে ডায়লগ বলছে লক্ষ্মী (সেনগুপ্ত) আর বোধহয় সন্দীপ (মুখোপাধ্যায়) এবং হলভর্তি দর্শক মাথা উঁচু করে দেখছে — সেটা সবার পক্ষেই একটা নতুন

অভিজ্ঞতা হয়েছিল। নাটক তৈরির সময় জড়িয়ে গেল এই বাড়িরই অন্যান্য বিভাগ। আদিত্য (মুখোপাধ্যায়), যে আজ রাশিবিজ্ঞান বিভাগের অধ্যাপকও বটে, আলো করল অডিটোরিয়ামের ফ্লোর থেকে। সেই শুরু। পটভূমি কলকাতা যে পটভূমি তৈরি করে দিয়ে গেল তাতে আমরা অচিরেই সায়েন্স কলেজের বাইরেও পরিচিতি পেয়ে গেলাম। নাটক নিয়ে বাইরেও অভিনয় করতে যাওয়া হল একাধিক বার। স্যার, অর্থাৎ প্রফেসর শর্মা এবং দিদি ভীষণ উৎসাহ দেখালেন। ডিপার্টমেন্টের সেমিনার, সিম্পোজিয়ামে নাটক বা মাইম করার জন্য ডাক পড়ল নিয়মিত। ১৯৭৮ এর পুনর্মিলন উৎসবে বস্তুতঃ পক্ষে প্রাক্তনীদের নাটক নিয়ে একটা আগ্রহ মাসাধিককাল আগে থেকেই তুঙ্গে উঠতে থাকল। সেবার আমরা করলাম লেডি গ্রেগরীর 'রাইজিং অব দি মুন' অবলম্বনে 'ভোরের আগে'। আমারই স্ক্রিপট্। এ নাটকের সলিল চৌধুরী কৃত একটা রূপান্তর খুবই জনপ্রিয় ছিল। আমি একটু বাড়তি স্বাধীনতা নিলাম। একটি বাড়তি চরিত্র আনলাম মূলতঃ সত্যকে (ঘোষ) সুযোগ করে দেবার জন্য। চরিত্রটা মোক্ষম জায়গায় লেগে গেল। যবনিকার সময় ইন্সপেক্টরের অসহায় আক্ষেপের পশ্চাদপটে নদী বাঁধের উপর দাঁড়িয়ে যে সামান্য দোকানী হা-হা-করে হাসছে—সেটা নাটকের মধ্যে একটা অভিঘাত এনেছিল। নাটকটির জন্য অনেকগুলো গান লিখেছিলাম, দীপক সুর করেছিল। তার গলা ও প্রাণবন্ত অভিনয়ে 'ভোরের আগে' ভীষণ সফল হয়েছিল। নানা জায়গায় এই নাটক অভিনীত হয়েছে। আমরা তো করেইছি—এমন কি আমার নামগন্ধও নেই কোথাও কিন্তু আমার নাটকটিই অভিনীত হচ্ছে দেখে প্রভূত মজা পেয়েছি—সূত্র ঐ বাড়তি পঞ্চম চরিত্রটি, যা সত্য করেছিল।

এই দুটি বছর শুভেন্দুবাবু কেবল দর্শকই ছিলেন। আগে নাটক করতেন, কিন্তু সম্প্রতি রিটায়ার করেছেন —এমন অবস্থা থেকে অধ্যাপক মুখোপাধ্যায়কে আমরা আবার ব্যাট হাতে মাঠে নামালাম। আমরা একসঙ্গে প্রথম করি সম্ভবতঃ বাদল সরকারের 'টেরোড্যাকটিল'। সালটা ১৯৮০ ই হবে। অ্যাবস্ট্রাকট নাটক 'ক্যাপটেন হুররা', বা '৩৩ (তেত্রিশ) তম জন্মদিবস' তখনও কোলকাতার মঞ্চে হৈ হৈ করে চলছে। শুভেন্দুবাবু করলেন বুজিবাবু-আলমারির ভিতর দিয়ে যাওয়া-আসা করেন। কিন্তু দর্শক হিসাবে যাঁরা পুনর্মিলনে আসেন তাঁরা এক্সপেরিমেন্ট গবেষণাগারে করেন, মঞ্চে চান সহজ আবেদনের নাটক। তাই ঠিক করলাম বাদল সরকারই করব, কিন্তু পুরোপুরি অ্যাবস্ট্রাক্ট নয়। খুব সফল ভাবে অভিনীত হল বাদল সরকারের দুটি নাটক পরপর দু'বছর— 'বল্লভপুরের রূপকথা' এবং 'রাম শ্যাম যদু'। বল্লভপুর দু'বার — প্রথমবার আমি ছাড়া, বোধহয় দীপক ছিল পরিচালক, দ্বিতীয়বার প্রেসিডেন্সী কলেজে ৮০এর দশকে অনুষ্ঠিত একটা রিইউনিয়নে। অনাদিদা (কুন্ডু) তখন সেখানে অধ্যাপক। নাটকে সুমনাকে (মুখোপাধ্যায়) দিয়ে করানো হল বল্লভপুরের রাজপ্রসাদের অশরীরী রাজামশাই, জয়ন্তী (সেনগুপ্ত) তার আকর্ষণে জাগতিক ভাবেই সাড়া দিতে চায় এই ব্যাপারটা একটা কোরিওগ্রাফির সাহায্যে স্যিলুয়েট ব্যবহার করে করা হয়েছিল। দর্শকরা রমনীয় অভিজ্ঞতা নিয়ে ফিরেছিলেন।

জয়ন্তীর কথা এসে গেল। আজ প্রতিটি রি-ইউনিয়নে জয়ন্তীকে মনে পড়ে। আমাদের সময় অলিখিত নিয়ম ছিল ছেলে-মেয়েরা একসঙ্গে নাটক করবে না। কে জানে কেন এই মধ্যযুগীয় নিয়ম আর কেনই বা তা মেনে

চলা হত। জয়ন্তীর মত এত প্রাণবন্ত মিশুকে মেয়ের পক্ষে আর আমাদের তো বটেই —তা মেনে চলার দায় ছিল না। স্যার-দিদির সমর্থন তো ছিলই (সেটা রোটেশনের যুগ ছিল না, আমরা বরাবরই স্যারকে হেড হিসাবে পেয়েছিলাম) ফলে তখন থেকে শুরু করে দিল্লী প্রবাসী হওয়ার আগে পর্যন্ত জয়ন্তী আমাদের স্থায়ী নায়িকা ছিল। ইন-হাউস হিরোইন যাকে বলে। কত নাটকে যে সে আমার বিপরীতে অভিনয় করেছে সব মনে আছে কিনা কে জানে। আমাদের থেকে বছর দুয়েকের জুনিয়র এই ব্যাচটায় জয়ন্তী ছাড়াও সমিত, উদয়ন এরা ছিল নাটকে উৎসাহী, সমিতের নামকরণ 'ভট্ট কোম্পানীর'র প্রোডাকশন চলল বেশ কয়েক বছর। জয়ন্তীর দিল্লী চলে যাওয়া তার স্বামী সুব্রত'র রাইসনা স্কুলে হেড মাস্টারের পদে যোগ দিতে যাবার সূত্রে। ওদের বিবাহের পরে সুব্রত নাটকগুলো দেখতে এসে অবধারিত ভাবে বলতো — আজকের দিনে জয়ন্তীর সঙ্গে আমার কোন সম্পর্ক নেই। বড় অকালে চলে গেল জয়ন্তী।

নাটকের কথায় ফিরি। বাদল সরকারের অপর যে নাটকটি আমরা ভীষণ সফলভাবে করেছিলাম সেটি হল রাম শ্যাম-যদু। আমি দীপক-সত্য। বয়সের ক্রমে বস্তুতঃ আমরা রিভার্স অর্ডারে আছি। কিন্তু নাটকের বয়োঃজ্যেষ্ঠ আমায় হতে হয়েছিল। এই নাটকে পাঁচুদার (চট্টোপাধ্যায়) আর্বিভাব অভিনেতা হিসাবে। পাঁচুদার মধ্যে একটা স্বাভাবিক অভিনয় দক্ষতা ছিল, এতো আমরা যারা ডিপোর্টমেন্টে যাওয়া আসা করতাম তারা সবাই জানি। মঞ্চে ওঠানামা দুরূহ ব্যাপার ছিল না, কেন না তখন বটানির নাটকের টানে একদম মঞ্চবিমুখ লোকেও অভিনয় করছে। ফলে পাঁচুদার জন্য চরিত্র লিখতে হল। ওপেনিং সিনে পাঁচুদা গান গাইতে গাইতে চুলোয় আঁচ দিচ্ছেন, চা বানাচ্ছেন আর আমরা তিন জেল পালালো আসামী র‍্যাম-শ্যাম-যদু এসে বসলাম সেই দোকানে — এখনও চোখে ভাসছে। পাঁচুদা চলে গেছেন অনেকদিন হল।

আজকে ভাবতে গেলে অবাক লাগে কি করে এই সব পূর্ণদৈর্ঘ্যের দেড়-দুই ঘন্টার নাটক মধ্যান্তর বিরতি সহ নামাতাম আমরা। প্রচুর ইমপ্রোভাইজেশন করতে হত। প্রথমতঃ উৎসাহী মাত্রেই মঞ্চে নামার সুযোগ ছিল। রি-ইউনিয়নের নাটকে উৎসাহ-ই বড় কথা, বাকীটার জন্য আমি ছিলাম। রোল লিখে, মূল নাটকে জুড়ে দেওয়া কোন ব্যাপার ছিল না, কেউই ধরতে পারত না কোনটা মূল আর কোনটা বানানো। দ্বিতীয়তঃ রিইউনিয়নের নাটকের বাজেটে কোনদিনই মনের মত সেট বা আলো করা যাবে না সেটা আমরা জানতামই। তাই বিকল্প ব্যবস্থা করা হত। কখনও মালিদের চৌকি, কখনও প্রফেসর এইচ. সি. গাঙ্গুলীর ইজিচেয়ার, কখনও স্যারের রিভলভিং বুক র‍্যাক, ম্যাসোনাইট বোর্ডের পার্টিশন সবই ব্যবহৃত হয়েছে সেট-তৈরী জন্য। এই সব বিকল্পকে দর্শকরাও সানন্দে মেনে নিতেন। ফলে সেটের জন্য বাহবাও জুটতো।

সব থেকে বেশিবার করা হয়েছে বোধহয় মনোজ মিত্র'র নাটক। শুরু হয়েছিল 'কেনারাম বেচারাম' দিয়ে। শুভেন্দুবাবু কেনারাম আর ওনার ডাবল বেচারাম হয়েছিল চন্দনদা (মুখোপাধ্যায়)। শুভেন্দুবাবুর ইমপস্টার কেনারামের চরিত্র, আমার অভিনীত নগেন পাঁজার সঙ্গে এমন চমৎকার বোঝাপড়ায় রচিত হয়েছিল যে আর খুব কম নাটকেই

এত পরিতৃপ্তি পেয়েছি অভিনয় করে। ওনার থেকে থেকেই 'হচ্ছে নগেন' ভোলার নয়। একটা ম্যানারিজমে নিয়েছিলাম অভিনয়ে। ডায়ালগ রিপিট করার মুদ্রাদোষ। কোন সহ অভিনেতাকে বাধা না দিয়েও তাঁরই কথা দ্বিতীয়বার বলবার এই বৈশিষ্ট নগেন পাঁজার চরিত্রে আনতে পেরেছিলাম। কাজটি সহজ ছিল না কিন্তু প্রায় পেশাদারি পর্যায়ের টীম ওয়ার্কে এটা যে মানে পৌঁছেছিল তা এমনকি গ্রুপ থিয়েটারের কেনারাম বেচারামকে চ্যালেঞ্জ জানাতে পারতো। এই প্রসঙ্গে একটা মজার কথা মনে আছে। নরেন বাবু (সিটি কলেজের নরেন্দ্রমোহন দত্ত) এই নাটকে অভিনয় করেছিলেন। এম.এল.এর ভূমিকা। নগেন পাঁজার সামনে এম. এল. এ, ভাষণ ঝাড়ছেন এই ছিল দৃশ্য। ডিপার্টমেন্টের ফটোগ্রাফার রঞ্জনদা মঞ্চের নীচে থেকে ফ্ল্যান বাল্ব ঝলকালেন। নরেনবাবু হঠাৎ বলে বসলেন ---- কোন কাগজে? স্ক্রিপটের কোথাও এমন কিছুটি নেই, হঠাৎ বলে বসলেন, এই ডায়ালগ। আমি মুহূর্তে সময় নষ্ট না করে জবাব দিলাম, 'মাকুন্দবাজার'। রঞ্জনদা থ হয়ে গেলেন। নরেনবাবু তো আরও হতভম্ব, আর হল শুদ্ধ ফেটে পড়ল হাততালি। আজ নরেনবাবুও আমাদের মধ্যে নেই।

আর একটি পূর্ণ্যদৈর্ঘের নাটক 'ঘুঘু'র কথা মনে পড়ছে। বিমল করের পালামৌ নষ্ট্যালজিয়ার সম্পৃক্ত কমেডি। আমি আর জয়ন্তী, নবীনতর প্রেমিক-প্রেমিকা হলেও শুভেন্দুবাবু আর সুমনা গৃহকর্তা ও কর্ত্রীর ভূমিকায় যে অভিনয়টি করেছিলেন তা আরও প্রাণবন্ত হয়েছিল। কোজাগরী পূর্ণিমার দিন কর্তা-গিন্নী বাইরে বেরোচ্ছেন, সন্ধ্যেবেলা। 'আজি এমন চাঁদের আলো, মরি যদি সেও ভালো ... গেয়ে শুভেন্দুবাবু ইমপ্রোভাইজ করে সুমনার থুতনি নেড়ে দিলেন— হাততালি আর থামতে চায় না।

সত্যব্রত ঘোষের কথা আগেই বলেছি। একাধিক নাটকে সেই মুখ্য চরিত্র। 'চোখে আঙুল দাদা' আমরা দু'বার করেছি। একবার আমি মুখ্য চরিত্রে একবার সত্য। শ্যামাকান্ত দাশের নাটক 'শবনম', হিন্দু যুবার ঘরে প্রাণ বাঁচাতে আশ্রয় নিয়েছে মুসলমান কন্যা শবনম। সত্য আর বোধ হয় জয়ন্তী করেছিল। তখন বাবরি ভাঙা হয়েছে। সময়ের নিরিখে এমন উপযুক্ত প্রয়োজনা হয়েছিল এটি যে আমার আর একবার করতে ইচ্ছা করে। 'মহাবিদ্যা'য় সত্য চোর। মনোজ মিত্রের এই নাটকে সত্য ছাড়া আর কাউকে চোর হিসাবে ভাবাই যায় না। আর এই সেদিন যে আমরা 'সাজানো বাগান' করলাম তাতে সত্যব্রত বাঞ্ছারাম করল যথেষ্ট দক্ষতার সঙ্গে। চল্লিশ বছরের সঙ্গী সে।

ক'জনে জানে যে রীতা কুন্ডুও একজন দক্ষ অভিনেত্রী। আমরা মোহিত চট্টোপাধ্যায়ের 'সুন্দর' করেছি রীতাকে মুখ্য চরিত্রে রেখে। এত হৃদয় ছুঁয়ে যাওয়া নাটক এটি যে, হেলা ফেলা করে তৈরী করার কোন সুযোগই নেই। রীতার তো ফেনোমেনাল স্মৃতি। প্রথম মহলাতেই সব ডায়লগ মুখস্থ, আমি বরাবরই উল্টো। রীতার চাপে সে যাত্রা সামলে নিয়েছিলাম। এখনকার অধ্যাপিকাদের মধ্যে মৌসুমী পোদ্দার সরকারও অভিনয়ে উৎসাহী। একসঙ্গে অভিনয় করলাম বাদল সরকারের 'সলিউশন এক্স' নাটকে। পঞ্চাশের দশকের এই নাটকের আবেদন কিন্তু আজও অম্লান। কোলকাতার মঞ্চে এই সময়ও অভিনীত হচ্ছে। ম্যাডামকে বল নাচের সুরে পা মেলাতে দেখে ছাত্রছাত্রীরা যার পর নাই খুশি হয়েছিল বলতে পারি।

মনে পড়ছে জয়ন্তী আর আমি করেছিলাম মনোজ মিত্রর 'পাখি' আশির দশকে। এই নাটকে গরীব ফেরিওয়ালার বাড়িতে নিমন্ত্রণ চেয়ে নিয়ে বড়লোক বন্ধুরা অনুষ্ঠানের দিন জানিয়ে দেয়—নেহাৎই ঠাট্টা ছিল সেটা, যথার্থই তারা গরীব বন্ধুকে বিপদে ফেলতে চায় না। এটা ফেরিওয়ালা আর তার মুখরা স্ত্রীকে কতটা আহত করেছিল তা পুনর্মিলন উৎসবে হৈ হৈ করতে আসা দর্শককে বোঝানো সহজ ছিল না— কিন্তু শেষ দৃশ্যে চোখে জল এসে গেল আমাদের দুজনেরই — হল নিঃস্তব্ধ।

বছর কয়েক হল নীলাঞ্জনের (চক্রবর্তী) মধ্যে এই ঘরানাকে ধরে রাখার একটা সম্ভাবনা দেখতে পাই। আমরা একসঙ্গে করলাম মনোজ মিত্র'র টু-ইন-ওয়ান, নাম বদলে 'জোড়-বিজোড়'। সম্পূর্ণ নতুন এক দল প্রাক্তনীকে পাওয়া গেল এই প্রথম। যারা সুঅভিনেতা-অভিনেত্রী। শুভার্থী মেয়েটিতো খুবই গুণী কিন্তু সে বোধ হয় বিদেশে। নীলাঞ্জন ও সপ্তর্ষি করেছিল সায়ামিজ টুইন। শরীরী অভিনয়ের দরকার ছিল প্রচুর। একে অন্যের মিরর ইমেজ এভাবে উপস্থাপিত করার চেষ্টা করা জোড়া দুই ভাইকে। ওদের চেষ্টায় হৈ হৈ করে উতরে গেল। এটা সম্ভবত ২০০৯-১০। পরের বছরই ওদের নিয়ে 'সলিউসন এক্স'। সেটিও সবার চেষ্টায় মনোগ্রাহী হয়েছিল।

প্রায় চল্লিশ বছরের মধ্যে এগুলি ছাড়াও অভিনীত হয়েছে আরও কয়েকটি নাটক। কখনও দুর্ঘটনা ঘটেনি এমন নয়। যেমন কমলাকান্ত। বঙ্কিমের কমলাকান্ত আর কতটুকু নাটক। তার মহলা মোটামুটি ভালই হল। অভিনয় শুরু হবার পর দেখা গেল প্রসন্ন গোয়ালীনি একদম শেষ ডায়ালগে পৌঁছে গেছেন। আমি কমলাকান্ত যতই তাঁকে শুরুতে নিয়ে আসতে চাই তিনি হোঁচট খেয়ে যবনিকাতেই ফিরে ফিরে যান। ফলে নাটক পনের মিনিটেই শেষ। এই গোয়ালীনিটির ভূমিকা কে করেছিল মনে নেই। মনে নেই সেই সব ছাত্রছাত্রীদের কথাও যাদের নিয়ে করেছিলাম নিকোলাই গোগোলের —ইনস্পেক্টর। পরপর বেশ কয়েকটি বছর প্রাক্তনীদের অংশগ্রহণ গৌণ ছিল প্রায়। এই পর্যায়ে বর্ত্তমান আর প্রাক্তনদের যৌথ প্রযোজনা হল পরশুরামের 'কচি সংসদ'। নাটক তো একদিনের, কিন্তু বয়সের সীমারেখা মুছে যাওয়া মহলার ক'দিন ও অভিনয়ের আগের মেক আপ রুমের স্মৃতি যথার্থই সঞ্জীবনী সুধার মত। তাই স্যার (শুভেন্দুবাবু) কেও টেনে নামাই, শরীর ভাল না থাকলেও, নিজেরাই ছুটে ছুটে আসি। তবে নবীনদের মধ্যে উৎসাহ দেখি না। কে জানে ততটা কেজো নই বলেই বোধ হয় অকাজের মণিমুক্তো সঞ্চয় করে রেখেছি। আরও পরিণত বয়সে এগুলির দিকে ফিরে তাকানো নেহাৎ কম প্রাপ্তি হবে বলে মনে হয় না।

স্বপন ভট্টাচার্য্য
প্রাক্তন ছাত্র - ১৯৭৭

শতবর্ষের আলোকে কিছু স্মৃতি, কিছু অনুভূতি

‘শতবর্ষ’ শব্দটির উন্মাদনা একটি বিরল অনুভূতি। সবার জীবনে এই অনির্বাচনীয় আনন্দ আসে না। এদিক দিয়ে আমি সত্যিই ভাগ্যবান, গর্বিত ও আনন্দিত।

১৯১৩-১৯১৪ আমাদের জাতীয় জীবনে বিশেষ গুরুত্বপূর্ণ। ১৯১৩ সালে কবিগুরু রবীন্দ্রনাথ ঠাকুর ‘আনলো মালা জগৎ জিনে’ মানে তিনি গীতাঞ্জলির উপর প্রথম ভারতীয় হিসেবে নোবেল পুরষ্কার পান। ১৯১৪ সালে প্রথম ভারতীয় হিসেবে ভারতীয় বিজ্ঞান কংগ্রেসের মূল অধিবেশনে সভাপতি হন স্যার আশুতোষ মুখার্জী। স্যার আশুতোষ মুখোপাধ্যায়ের সঙ্গে ছিলেন সৃজনশীল ব্যক্তিত্ব যেমন আচার্য্য জগদীশ চন্দ্র বসু, আচার্য্য প্রফুল্ল চন্দ্র রায়, আচার্য্য ব্রজেন শীল, স্যার তারক নাথ পালিত (দুই স্যায়েন্স কলেজের জায়গা ও অট্টালিকা তাঁর অবদান)। এর সঙ্গে ছিলেন স্যার রাসবিহারী ঘোষ, দ্বারভাঙ্গার মহারাজা শ্রী অরবিন্দ, রাজা সুবোধ চন্দ্র মল্লিক, ডঃ সুবোধ চন্দ্র মহালনবীশ এবং অন্যান্য বহু মনীষী শিক্ষাজগতের উন্নতিকল্পে তাঁদের জীবনের সঞ্চয় ও আত্মত্যাগ দ্বারা কলকাতা বিশ্ববিদ্যালয় ও যাদবপুর জাতীয় শিক্ষা পরিষদ প্রতিষ্ঠিত হয়।

১৯১৪ সালে প্রথম মহাযুদ্ধ শুরু হয় ১৯১৮ সালে এই যুদ্ধ শেষ হয়। যতদূর জানা গিয়েছে ১৯১৪ সালে বালিগঞ্জ সায়েন্স কলেজের পত্তন হয় স্যার তারকনাথ পালিতের দাক্ষিণ্যে এবং স্যার আশুতোষ ও অন্যান্য মহাপুরুষের সৌজন্যে।

এই যুদ্ধের দামামার মধ্যেই ভারতীয় রাজনীতিতে প্রচন্ড দুর্যোগ দেখা যায়। মহাত্মা গান্ধী দক্ষিণ আফ্রিকা থেকে ফিরে অহিংস ও অসহযোগ প্রত্যার্বতন করেন।

আগেই বলেছি, শিক্ষা জগতে স্যার আশুতোষ এক নবযুগের সূচনা করেন। আমি বালিগঞ্জ জগদ্বন্ধু ইনষ্টিটিউশন থেকে ১৯৪৭ সালে ম্যাট্রিকুলেশান পরীক্ষা পাশ করি। জগদ্বন্ধু ইন্‌ষ্টিটিশনের ‘শতবর্ষ’ উৎসবের সঙ্গে সঙ্গে বালিগঞ্জ সায়েন্স কলেজের শতবর্ষ অনুষ্ঠানের সানাইয়ের সুরের মুর্ছনা আরম্ভ হয়েছে। আমি সত্যি এদিক দিয়ে পরম সৌভাগ্যবান।

এর আগে আমি যখন কলকাতা প্রেসিডেন্সী কলেজের ছাত্র ছিলাম, তখন ১৯৫৪ সালে প্রেসিডেন্সী কলেজের ‘শতবর্ষ উৎসব’ পালিত হয়। প্রেসিডেন্সী কলেজের প্রাক্তনী, ভারতের প্রথম রাষ্ট্রপতি প্রয়াত ডঃ রাজেন্দ্র প্রসাদের উপস্থিতিতে এক নূতন আনন্দের বন্যা প্রবাহিত হয়েছিল. রাজেন্দ্র প্রসাদের সমসামায়িক কয়েকজন সতীর্থ সেই অনুষ্ঠানে উপস্থিত ছিলেন। প্রথমতঃ এখানে জানিয়ে রাখি যে ডঃ রাজেন্দ্র প্রসাদ ছাত্র হিসেবে বেশ কয়েক বৎসর হিন্দু হোষ্টেলে ছিলেন। হোষ্টেলের প্রবেশ মুখে পাথরের ফলকে এখনও জ্বলজ্বল করে লেখা আছে। সেই সময়

প্রেসিডেন্সী কলেজের অধ্যাপক ছিলেন আন্তর্জাতিক খ্যাতিসম্পন্ন উদ্ভিদবিদ্ প্রয়াত অধ্যাপক ডঃ যতীশ চন্দ্র সেনগুপ্ত (জে. সি, সেনগুপ্ত)। তিনি খুব সুন্দরভাবে অনুষ্ঠানটি পরিচালনা করেছিলেন। ডঃ রাজেন্দ্রপ্রসাদ ডঃ সেনগুপ্তকে শ্রীমান প্রিনসিপাল বলে যখন প্রথমেই সম্বোধন করেন, গোটা শ্রোত্রীমণ্ডলী আনন্দে হর্ষধ্বনি দিয়ে তাঁকে বরণ করেন।

যাক্-এবার আসি বালিগঞ্জ বিজ্ঞান কলেজের উদ্ভিদ্ বিদ্যা বিভাগের শতবর্ষের আলোকে।

আমাকে বলা হয়েছে বালিগঞ্জ বিজ্ঞান কলেজে আমার অভিজ্ঞতা সম্বন্ধে লিখতে।

জগদ্বন্ধু ইন্‌স্টিটিউশনে প্রাক্তনীর মুখপত্র 'খেয়া' তে শতবর্ষ উদ্‌যাপনের যে প্রথম সংজ্ঞা প্রকাশিত হয়েছে তার মূলমন্ত্র হয়েছে,

"এই আমাদের নন্দন লোক,

এই তো দেবালয় .... "

এই মহামন্ত্র শিক্ষা প্রতিষ্ঠানের পক্ষেই সমান ভাবে প্রযোজ্য।

প্রথমেই আমি পুণ্যাত্মা দানবীর কলকাতা বিশ্ববিদ্যালয়ের উচ্চ-শিক্ষা-বিস্তারের অন্যতম পুরোধা স্যার তারকনাথ পালিতের প্রতি বিনম্রচিত্তে আমার অন্তরের অন্তরতম স্থান থেকে শ্রদ্ধাঞ্জলি জানাই।

এই বিদগ্ধ আইনজীবী ও বিশ্বপ্রেমিক ১৮৩১ সালে কলকাতায় এক বিখ্যাত ধনী পরিবারে জন্মগ্রহণ করেন। তাঁর পিতার নাম ছিল প্রয়াত কালিশংকর পালিত। তারকনাথের শিশু ও কৈশোরের কাল কাটে হুগলী জেলার অমরপুর গ্রামে। কলকাতায় তিনি হিন্দু কলেজে (বর্তমান প্রেসিডেন্সী বিশ্ববিদ্যালয়ে) পড়ার পর বিলেতে যান আইনশাস্ত্র পড়ার জন্য। সেখানে থেকে ১৮৭১ সালে আইন পাশ করে দেশে ফেরেন।

অল্প সময়েই তিনি আইন ব্যবসায় খ্যাতি লাভ করেন। তারকনাথ ভারতীয় জাতীয় কাউন্সিল থেকে পদত্যাগ করেন।

কাশিমবাজারের মহারাজা মনীন্দ্র চন্দ্র নন্দীর সহযোগিতায় তিনি কারিগরী শিক্ষার জন্য একটি প্রযুক্তি প্রতিষ্ঠান স্থাপন করেন কলকাতায়। তাঁর ইচ্ছে ছিল, এই প্রতিষ্ঠানটি সরকারী কারিগরী বিদ্যালয়ের সংযুক্তি করণে, কিন্তু বাস্তবে সেটি রূপায়ণ করা সম্ভব হয় নি। তিনি প্রতি মাসে এই প্রতিষ্ঠানকে আড়াই হাজার টাকা অনুদান দিতেন।

স্যার তারকনাথ কলকাতা বিশ্ববিদ্যালয়কে বিজ্ঞান শিক্ষা সম্প্রসারণের জন্য তাঁর জীবনের সঞ্চিত ধন ১৫ লক্ষ টাকা করেছিলেন। বিশ্ববিদ্যালয়কে এই টাকা দান করার সময় একটি শর্ত আরোপ করেছিলেন যে রসায়ন ও পদার্থ বিদ্যার অধ্যাপক যেন ভারতীয় বংশোদভুত হয়। যদি এইরূপ যোগ্যব্যক্তি না পাওয়া যায়, তবে ভারতীয় অধ্যাপকদের সুযোগ্য প্রশিক্ষণ দিয়ে এবং দরকার হলে বিদেশে পাঠিয়ে উচ্চতর প্রশিক্ষণ দিয়ে আনতে হবে। প্রসিদ্ধ আইনজীবী ও শিক্ষানুরাগী স্যার রাসবিহারী ঘোষের (যাঁর পূণ্যস্মৃতির স্মরণে কলকাতার রাসবিহারী এভিনিউ) সঙ্গে তিনি কলকাতা বিজ্ঞান কলেজ প্রতিষ্ঠা করার জন্য বিপুল অর্থ দান করেন। এই সঙ্গে তিনি তাঁর নিজস্ব বালিগঞ্জ সারকুলার রোডের বাস ভবন কলকাতা বিশ্ববিদ্যালয়কে দান করেন।

১৯১৩ সালে তারক নাথ পালিতের সম্মানে একটি বৃত্তি প্রতিষ্ঠিত হয়, এবং এই বছরেই ব্রিটিশ সরকার তারক নাথ পালিতকে 'স্যার' উপাধিতে ভূষিত করেন।

তারক নাথ জাতীয়তাবাদের প্রবল সমর্থক ছিলেন। তিনি জাতীয় উন্নয়ন ও শিক্ষাকে ভারতীয়করণের চেষ্টা করেছিলেন। তিনি দৃঢ় বিশ্বাস করতেন ভারতবর্ষের অর্থনীতি বৈজ্ঞানিক শিক্ষা ও শিল্পকরণের উপর সম্পূর্ণ নির্ভরশীল। যদিও তিনি হিন্দু ধর্মের একজন বিশিষ্ট প্রবক্তা ছিলেন, কিন্তু তিনি জাতিভেদ ও অস্পৃশ্যতার কঠোর বিরোধী ছিলেন। তিনি ১৯১৪ সালের তেসরা অক্টোবর পরলোক গমন করেন।

এবার আসি আমার প্রতিপাদ্য বিষয় বালিগঞ্জ বিজ্ঞান কলেজের উদ্ভিদবিদ্যা বিভাগের অভিজ্ঞতা ও স্মৃতি সম্বন্ধে। ১৯৪৯ সালে কোলকাতার আশুতোষ কলেজ থেকে আই এস সি পাশ করে বালিগঞ্জ বিজ্ঞান কলেজে উদ্ভিদ বিদ্যায় অনার্স নিয়ে ভর্তি হলাম। পরীক্ষার ফল খুব ভাল ছিল না। প্রেসিডেন্সী কলেজে যাবার সাহস হল না। সেইবারই কলকাতা সিটি কলেজে প্রথম উদ্ভিদ বিদ্যায় অনার্স খুললো। আর বটানি অনার্স ছিল দার্জিলিং কলেজে।

আমি তখন ঐতিহাসিক 'পালিত ভবনে' ছাত্র হিসেবে প্রবেশ করলাম। এই ঐতিহ্যময় ভবনের দালান, কারুকার্য্য, বাগান, পুকুর এবং বিচিত্র গাছপালা-পুকুরের চারিদিকে সারি সারি তালগাছ, সেগুন, শিরিষ, আম, বাবুল এবং অন্যান্য সুন্দর গাছ-পালা এক স্বর্গীয় পরিবেশ সৃষ্টি করেছিল। দিবারাত্রি পশু, পাখীর কুজনে মনকে মোহিত করতো। দুটো বিশাল বিশাল অট্টালিকার করিডোর দ্বারা সংযুক্ত, রং-বেরং এর পাথর দিয়ে মেঝে তৈরী, অপূর্ব গাড়ী বারান্দা, সুন্দর সুন্দর মোজাইক করা হলঘর ও মাঝে মাঝে Sprial সিঁড়ি এবং চারিদিকের মন মুগ্ধকর পরিবেশ সবাইকে আকৃষ্ট করতো। স্বভাবই গাছপালার উপর প্রাণের টান আসতো ও মন আনন্দে পরিপূর্ণ হতো।

আমি যখন বালিগঞ্জ সায়েন্স কলেজে ভর্তি হই, তখন সেখানে Botany (Honours ও P.G.), Zoology (Honours ও P.G.) এবং Anthropology (Honours ও P.G.) পড়ানো হত। Honours ছাত্র-ছাত্রীদের পাশ Course এ পড়ার জন্য কলেজে যেতে হত।

এবার আমি আবার আমাদের Science College-এর Botany (Hons.)-এর বিষয়ে আসি। Botany প্রধান ছিলেন ঘোষ অধ্যাপক ডঃ প্রভাত চন্দ্র সর্বাধিকারী। তিনি আগে Colombo University Botany বিভাগীয় প্রধান ছিলেন।

অধ্যাপক সর্বাধিকারী প্রথম এশিয়া থেকে Botany তে Huxley Gold medal পান। বিলেত থেকে Osmundaceae Cytology করে Ph. D. হন। তিনি খুব ভদ্র, নম্র ও মৃদুভাষী ছিলেন। আমরা সবাই নিশ্চিত মনে তাঁর কাছে গিয়ে আমাদের অসুবিধের কথা বলতাম। তিনি সহানুভূতির সঙ্গে শুনতেন ও বিবেচনা করতেন। উনি উপরের যে ঘরে বসতেন, সেটি ছিল জরাজীর্ণ ও শতছিদ্র। বৃষ্টির দিনে মাঝে মাঝে জল ঢুকতো। তিনি নিজেই চেয়ার ঘুরিয়ে বসতেন। মাঝে মাঝে ছাতা মাথায় দিতেন।

সেখানে উল্টোদিকে ছিল অক্ষয় বাবু, প্রিয় নাথ বসু ইত্যাদি জনপ্রিয় নাম। প্রিয় নাথ বাবু পরে দিলখুশা স্ট্রীটে সায়েন্স কংগ্রেস অফিসে কাজ করতেন।

তখনকার দিনে ডঃ ইলাবন্ত ব্যানার্জী ছিলেন দোর্দণ্ড প্রতাপ শিক্ষক। তিনি D. Sc. ছিলেন। Embryotogy, Taxomomy পড়াতেন, আমরা খুব ভয় পেতাম। খুব রাশভারী ও শঙ্খলা পরায়ণ ছিলেন। কিন্তু অন্তঃকরণটি ছিল খুব কোমল। কোন অসদাচরণ পছন্দ করতেন না।

Plant Physiology তদানীন্তন অধ্যাপক ডঃ সৌরীন্দ্র মোহন সরকার উচ্চতর কর্মের আকর্ষণে দিল্লীতে IARI পুসাতে ছিলেন। তাঁর জায়গায় ছিলেন ডঃ চিত্ততোষ দত্ত, দ্বিতীয় মহাযুদ্ধের সময় তিনি বিলেতে সাত বছর অন্তরীণ ছিলেন। ডঃ শচীন্দ্র নাথ ব্যানার্জী ছিলেন Mycology ও Plant Pathology-র Charge-এ। তিনিও সেই সময় বিলেতে গিয়েছিলেন Ph. D. করতে। তাঁর জায়গায় সিটি কলেজের উদ্ভিদ বিদ্যা বিভাগের অধ্যাপক অজিত কুমার গাঙ্গুলি কাজ করতেন। বিখ্যাত আন্তর্জাতিক খ্যাতিসম্পন্ন Paleobotanist অধ্যাপক অমিয় কুমার ঘোষ মহাশয় অস্থায়ীভাবে বসু বিজ্ঞান মন্দিরে Registrar-এর পদে কর্ম নির্বাহ করতে আহ্বান পেয়েছিলেন। আর ছিলেন দুইজন নবীন শিক্ষক। Paleobotany তে সদাহাস্যময় ডঃ জিতেন সেন (প্রসিদ্ধ শিক্ষাবিদ প্রয়াত মণি সেনের পরিবারের) যিনি পরে বাগানের অধ্যক্ষ ও ডেপুটি ডাইরেক্টার ছিলেন। কিন্তু দুর্ভাগ্যবশত তিনি মাত্র ৪৬ বছরে ১৯৬৬ সালে বাগানেই পরলোক গমন করেন। আর ছিলেন আমাদের পরম শ্রদ্ধেয় চির নবীন ও চিরসবুজ অধ্যাপক অরুণ কুমার শর্মা। যিনি ভগবানের বরপুত্র। ভগবানের কাছে তাঁর শতায়ু কামনা করি। দেশে ও বিদেশে তিনি এক অবাক বিস্ময়। আমাদের সৌভাগ্য যে আমরা তাঁকে শিক্ষকতার প্রায় প্রাথমিক স্তর থেকেই দেখেছি।

আর Supporting staff হিসেবে অধ্যাপক যোগেন্দ্র চন্দ্র ব্যানার্জীকে পেয়েছিলাম। তিনি আমাদের algae ও Systematic পড়াতেন। তিনি ও প্রয়াত প্রফুল্ল বসু মহাশয় Practical Class-এ প্রকাশবাবুর (Specimen collection ও identifier হিসাবে) সঙ্গে ডঃ ইলাবন্ত ব্যানার্জী ও যোগেন বাবুকে সর্বতোভাবে সাহায্য করতেন।

আমাদের বিভাগের শিক্ষক মণ্ডলী সম্বন্ধে মোটামুটি একটা ধারণা দিলাম।

এবার সংলগ্ন Anthropology department-এ প্রধান সম্বন্ধে শুধু একটা কথাই বলছি। তিনি ছিলেন পণ্ডিত ঈশ্বরচন্দ্র বিদ্যাসাগর মহাশয়ের দৌহিত্র অধ্যাপক ক্ষিতীশ চন্দ্র চট্টোপাধ্যায় মহাশয়। ছয় ফিটের উপর দীর্ঘ, সুন্দর সুঠাম চেহারা। প্রচন্ড ব্যক্তিত্ব সম্পন্ন, সাদা খদ্দরের ধুতি পাঞ্জাবী পরিহিত থাকতেন। দেখলেই শ্রদ্ধায় মাথা নত হত। তিনি নেতাজী সুভাষ চন্দ্র বসু ও প্রসিদ্ধ কবি দ্বিজেন্দ্র লাল রায়ের সুপুত্র সুরকার দিলীপ কুমার রায়ের সমসাময়িক ছিলেন। নৃতত্ব বিভাগের আর একজন অধ্যাপক খুব জনপ্রিয় ছিলেন। তাঁর নাম ছিল অধ্যাপক মীনেন বসু। তিনি তদানীন্তন হস্টেলের অধ্যক্ষ ছিলেন এবং ছাত্র মহলে খুব জনপ্রিয় ছিলেন। দোতালা হস্টেলের সামনে একটি বড় ছাতিম গাছ (Alstonia scholaris) ছিল। আমাদের এক বন্ধু (সতীর্থ) সেখানে থাকতো। সারদা নন্দ সেন (বিধান)। আমরা মাঝে মাঝে আড্ডা দিতাম। বিধান খুব সাদাসিদে ছিল এবং ডঃ ইলাবন্ত ব্যানার্জীর খুব প্রিয় ছিল। তিনি বিধানকে দিয়ে খুব মজার মজার কান্ড করতেন।

এবার আসি জীববিদ্যা (Zoology) বিভাগ সম্বন্ধে। তার প্রধান অধ্যাপক তখন ছিলেন ডঃ হিমাদ্রি মুখোপাধ্যায়, পাশ্চাত্য প্রধান বেশভূষা পরতেন। তারপর ছিলেন অধ্যাপক জে, এন ভাদুড়ী। দেখতে খুব সুন্দর ছিলেন। তার মেয়ে রুনু ভাদুড়ী আমাদের উদ্ভিদবিদ্যা বিভাগের ছাত্রী ছিল। রুনুর স্বামী বিশিষ্ট ক্রিকেটার কল্যাণ মিত্র এখন ইডেন গার্ডেনের কিউরেটর আছে।

আর ছিলেন অধ্যাপক ডঃ দুর্গা প্রসন্ন মুখোপাধ্যায়। তিনি খুব শান্তশিষ্ট ছিলেন। আর ছিলেন Fisheries-এর মনিবাবু সেখানে আমাদের campass এর canteen ছিল।

এবার আসি পড়াশুনার ব্যাপার। আগেই বলেছি আমি কলেজে পড়তাম। আমাদের ব্যাচে বোধহয় আটজন ছাত্রছাত্রী ছিলাম। একজন মহিলা ছিলেন রাধারানী। পরে আর পড়েনি।

তিনতলায় ক্লাশ ঘরে কোষ বিদ্যা ও Plant Breeding এর Class নিতেন অধ্যাপক সর্বাধিকারী। খোলা জানালার উদাসভাবে পুকুরের তাল গাছের সারির দিকে তাকিয়ে থাকতাম। আগেই বলেছি নিপাট ভদ্রলোক ছিলেন। বেশীদিন বাইরে থেকে মানসিকতা সেইরূপ ছিল। পড়াতে পড়াতে মাঝে মাঝে বলতেন "to make the long story short".

এবার আসি ডঃ ইলাবন্ত ব্যানার্জীর ক্লাসের কথা। তিনি নিচের ক্লাস ঘরে খুব দাপটের সঙ্গে ক্লাস নিতেন। ওনার একটা Mannerism ছিল। ক্লাস নিতে নিতেই মাঝে মাঝে টাঙ্গানো বিরাট Screen-এর পেছনে যেতেন।

এবার আসি Plant Physiology- এর অধ্যাপক ডঃ চিত্ততোষ দত্তের Class এর কথায়। তিনি কিছুটা Style করে, কিছুটা Stammer করে চিত্তাকর্ষক ভাবে পড়াতেন। Photosynthesis ছিল তাঁর বিষয়। সেটা পড়াতেই তাঁর অনেক সময় লাগতো। অন্যান্য বিষয়ে মনোনিবেশ করতে সময় চলে যেতো। ছাত্র-ছাত্রীদের সঙ্গে খুব মিশতেন তাতে তাঁর আভিজাত্যই প্রকাশ পেতো। ছাত্র-ছাত্রীদের গতিবিধি ও কান্ড-কারখানা দেখে প্রায়ই বলতেন Botany Department marriage bureau হয়ে গেল। যৌবনের প্রেম তরঙ্গ রুধিবে কে?

ডঃ জে, সেন (জিতেন বাবু) আমাদের Bryophytes and Gymnosperm পড়াতেন এবং Palaeobology তে রানীগঞ্জ Coal Belt এর উপর গবেষণা করতেন। উনি বিখ্যাত M. Sen-এর পরিবারের। ইংরেজী বলার কায়দা ও শৈলী ছিল খুব সুন্দর।

এবার আসি অধ্যাপক অরুণ কুমার শর্মার সম্বন্ধে। তিনি আমাদের তখনও পড়াতেন। তখনও তিনি এখনকার মতো ছিপ্‌ছিপে এবং ছটছটে ছিলেন। সবাই অরুণবাবু বলতেন। সমসাময়িক senior-রা অরুণদা বলতেন। ১৯৪৫ সালে M.Sc. পাশ করে Botanical Survery তে Plant Taxonomy তে Dr. R. S. Rao-সঙ্গে training নেন। আমরা যখন পড়ি, তখন তাঁর শিক্ষকতার দ্বিতীয় বর্ষ। পরে পাঁচ/সাতজন D.Sc. ও D.Phil তৈরী করে নিজে D.Sc.হন। স্যার সরস্বতীর বরপুত্র। প্রচন্ড মেধা ও স্মরণ শক্তি।

তার যে কোন সময়ের ছাত্র-ছাত্রীদের নাম এখনও মনে আছে। নীচের Class room- এ Class নিতেন। খুব দ্রুতগতিতে ক্লাসে এসে কোটটি চেয়ারের মধ্যে ঝুলিয়ে Note দিতেন, ছবি আঁকতেন এখন তো তিনি প্রায় কিংবদন্তী।

এবার আসি তদানীন্তন প্রবীণ City College থেকে আগত অধ্যাপক প্রয়াত অজিত গাংগুলির সম্বন্ধে। তিনি ড. শচীন্দ্র নাথ বন্দোপাধ্যায় যখন বিলেতে Ph. D. করতে যান, তখন আমাদের Mycology ও Plant Pathology পড়াতেন। তিনি খুব ক্ষুরধার বুদ্ধিসম্পন্ন ছিলেন। দরকার হলে ঝাঁঝালো কথাবার্তাও বলতেন।

ড. ইলাবন্ত ব্যানার্জী যোগেন্দ্রবাবু ও প্রকাশবাবুকে নিয়ে কলকাতার কাছাকাছি যেমন Agri-Horticultural Garden, আলিপুর ঠাকুরপুকুর, সরসুনা এলাকায় যেতাম এবং গাছের নমুনা সংগ্রহ করে আনতাম। পরে সেগুলো সনাক্তকরণ করে Field Note পেশ করতাম। Excursion খুব আনন্দেই হত।

এইভাবেই দিন চলতে লাগলো। আমাদের সময় সিনিয়র ছাত্র-ছাত্রীরা আমাদের ভালবাসতেন এবং আমাদের সাহায্যে করতেন। এদের মধ্যে প্রথমেই নাম করবো ডঃ সত্যব্রত সরকারের। শ্যামবর্ণ, ছিপছিপে বুদ্ধিদীপ্ত ব্যক্তিত্ব

সম্পন্ন চেহারা ছিলেন M. Sc. পাশ করে জার্মানীতে Max Plank Institute-এ কাজ করেন, এখনও সেখানেই আছেন। সবাইএর সঙ্গে হাসিখুশি ভাবে মিশতেন। প্রয়াত মাস্টার মশায় অধ্যাপক যতীশ চন্দ্র সেনগুপ্তের মৃত্যুবার্ষিকীর সময় সত্যব্রতদাকে আমি "Sir" সম্বন্ধে কিছু লেখার জন্য অনুরোধ করেছিলাম। তিনি সুন্দরভাবে "Sir" সম্বন্ধে একটি আমাকে "Write up" পাঠিয়ে ছিলেন। সেটি এখনও সযত্নে রেখেছি।

আর ছিলেন সুমধুরভাষিনী সদাহাস্যময়ী দীপ্তিদি, মাধুরী, স্নেহকণাদি, প্রয়াত অর্চনাদি, ডাঃ সনৎ মজুমদার, চিত্রাদি, প্রমুখ। এখন কে কোথায় আছেন জানি না। আমার অন্তরের অন্তস্থল থেকে শ্রদ্ধা জানাই।

আমাদের সময় Presidency College, Science College ও City-র ছাত্র-ছাত্রীরা কমসংখ্যায় থাকায় পরস্পরকে চিনতাম ও জানতাম। বিভাগের ছাত্র-ছাত্রীদের সঙ্গেও হাসি ঠাট্টার মধ্যে একটি অনাবিল সুন্দর পরিবেশ ছিল।

এদিকে অধ্যাপক সৌরীন্দ্র মোহন সরকার দিল্লী থেকে এসে ও অধ্যাপক শচীন্দ্র নাথ ব্যানার্জী বিলেত থেকে Ph. D. করে Science College-এ যোগদান করলেন। ডঃ চিত্ততোষ দত্ত ও অধ্যাপক অজিত গাংগুলি চলে গেছেন। সর্বোপরি আমাদের প্রিয় ঘোষ অধ্যাপক ড. প্রভাত চন্দ্র সর্বাধিকারী প্রয়াত হলেন।

অধ্যাপক সরকার ছিলেন বিনয়ী ও সরলতার প্রতীক, দিনে যত বার হতো, ততবারই বল্‌তেন কি ভালো তো? তিনি প্রায় সমস্ত পৃথিবীর Plant Physiology ও Bio-Chemical Botanical Society সাথে সংযুক্ত ছিলেন। 1978 সালে প্রথম বাঙালী বটানিস্ট হিসেবে Indian Science Congress এ সভাপতি হন এবং আমেদাবাদের অধিবেশনে সভাপতিত্ব করেন।

আমার শরীর খারাপ থাকার জন্য বহুদিন Class করতে পারিনি। পঞ্চম বর্ষ শেষে প্রায় Class-এ যোগ দিলাম। মনে কোন উদ্যাম ও উৎসাহ পেতাম না। প্রেসিডেন্সী কলেজ ও বালিগঞ্জ Science College -ছোটাছুটি করতাম। সুনন্দা ও চিন্ময় আমাকে সবসময় সাহায্য করতো। সেজন্য আমি ওদের কাছে ঋণী।

নূতন সতীর্থদের মধ্যে দীপেশ, গোলোক, পুন্যদেও প্রসাদ, মায়া, সুজাতা, সুজয়, সুনির্মল, নরেন শী, লালা প্রণব কুমার, নৃপেন রায় তপাদার ও অন্যান্য অনেকে ছিল।

ওরা অনেকেই অবসর সময় library-তে note নিতো। আমাদের সময় ও ছিল না। আমরা তখন বন্ধু-বান্ধবের সঙ্গে আড্ডাই দিতাম। আগের batch-এর আর্য্য বল, অশোক সিংহ, সলিলদা (চট্টোপাধ্যায়), হরিদাস, অতুল, নৃপেনদা (ভট্টাচার্য্য) এবং সবার সঙ্গেই খাতির ছিল। প্রবীর গুহ ঠাকুরতা, রঞ্জিতদাও আমায় খুব ভালবাসতেন।

সেই পরের batch-এর ছাত্র-ছাত্রীদের সঙ্গে — যেমন হিমানী, মীরা, আরতি, উপেন, অশোক লাহিড়ী, রবীন মুখোপাধ্যায়, হৃষিকেশ, রমেন, অমল, সবিতা, উদয় সেন, তুহিনরা প্রমুখ এবং অন্যান্য অনেকের সঙ্গেই হৃদ্যতা হয়েছিল।

Time and Tide wait for none.

নূতন অধ্যাপকদের Class-এ আবার ছুটতে হত, অধ্যাপক ইলাবন্ত ব্যানার্জী, অধ্যাপক অরুণ শর্মা, অধ্যাপক জিতেন সেন এর পড়ানোর কথা Honours প্রসঙ্গে আগেই জানিয়েছি।

অধ্যাপক সরকার সুন্দরভাবে Plant Physiology পড়াতেন। অধ্যাপক শচীন্দ্র নাথ বন্দ্যোপাধ্যায় তদানীন্তন পিয়ন মজিদকে সঙ্গে নিয়ে একগাদা বই নিয়ে আসতেন। Edible Fungi পড়ানো সময় অতি সুন্দরভাবে বোঝাতেন। এখনও সুন্দরভাবে চোখে লেগে আছে।

আগেই বলেছি, আমরা তিনজন, সুনন্দা, চিন্ময়, ও আমি প্রেসিডেন্সী কলেজে -এর জন্য ছুটতাম।

আরো অনেক কথা লেখবার ইচ্ছা ছিল। সময়ের অভাবে সে ইচ্ছা পূরণ হলো না।

দ্বিজেন্দ্র নারায়ণ গুহ বক্সী
প্রাক্তনী ছাত্র - ১৯৫৪

List of Plants in Tarak Nath Palit Shikha Prangan

Sl. No.	Name of Taxa	Family	Sl.No	Name of Taxa	Family
1.	*Polyalthia longifolia* (Sonn.) Thwaites	Annonaceae	2.	*Ficus elastic* Roxb.ex Hornem.	Moraceae
3.	*Ptychosperma macarthurii* (H. Wendl. Ex H.J. Veitch) H. Wendl. Ex Hook f.	Arecaceae	4.	*Syzygium cumini* (L.) Skeels	Myrtaceae
5.	*Putanjiva roxburghii* Wall.	Euphorbiaceae	6.	*Hamelia patens* Jacq.	Rubiaceae
7.	*Bombax ceiba* L.	Bombacaceae	8.	*Mimusops elengi* L.	Sapotaceae
9.	*Sterculia foetida* L.	Sterculiaceae	10.	*Alstonia scholaris* (L.) R. Br.	Apocynaceae
11.	*Artocarpus heterophyllus* Lam.	Moraceae	12.	*Plumeria rubra* L.	Apocynaceae
13.	*Roystonea regia* (H.B. & K.) O.F. Cook	Arecaceae	14.	*Spathodea campanulata* P. Beauv.	Bignoniaceae
15.	*Mitragyna parvifolia* (Roxb.) Korth.	Rubiaceae	16.	*Adenanthera pavonina* L.	Mimosaceae
17.	*Ravenala madagascariensis* (J.F. Gmell.) Sonn.	Musaceae	18.	*Mangifera indica* L.	Anacardiaceae
19.	*Borassus flabellifer* L.	Arecaceae	20.	*Grevillea robusta* A. Cunn. Ex R.Br.	Proteaceae
21.	*Acacia auriculiformis* A. Cunn. Ex Benth.	Mimosaceae	22.	*Saraca asoca* (Roxb.) De Wilde	Caesalpinaceae
23.	*Grewia asiatica* L.	Tiliaceae	24.	*Artocarpus altilis* (Parkinson ex F.a. Zorn) Fosberg	Moraceae
25.	*Artocarpus lacucha* Buch.-Ham.	Moraceae	26.	*Neolamarckia cadamba* (Roxb.) Bosser	Rubiaceae
27.	*Pithecellobium dulce* (Roxb.) Benth.	Mimosaceae	28.	*Madhuca longifolia* (Koen.) Mac Bride var. *latifolia* (Roxb.) A. Chev.	Sapotaceae

Sl. No.	**Name of Taxa**	**Family**	**Sl.No**	**Name of Taxa**	**Family**
29.	*Cassia fistula* L.	Caesalpinaceae	30.	*Diospyros malabarica* (Desr.) Kostel.	Ebenaceae
31.	*Azadirachta indica* A. Juss.	Meliaceae	32.	*Peltophorum pterocarpum* (DC.) Baker ex K. Heyne	Caesalpinaceae
33.	*Erythrina variegate* var. *orientalis* (L.) Merr.	Fabaceae	34.	*Derris robusta* (DC.) Benth	Fabaceae
35.	*Ficus religiosa* L.	Moraceae	36.	*Litsea glutinosa* (Lour.) C.B. Rob.	Lauraceae
37.	*Swietenia macrophylla* King	Meliaceae	38.	*Cocos nucifera* L.	Arecaceae
39.	*Acalypha hispida*	Euphorbiaceae	40.	*Manilkara zapota syn. Achras sapota*	Sapotacea
41.	*Acorus calamus*	Araceae	42.	*Justicia adhatoda syn. Adhatoda vasica*	Acanthaceae
43.	*Aegle marmelos*	Rutaceae	44.	*Agathis robusta*	Araucariaceae
45.	*Aloe vera*	Asphodelaceae	46.	*Abroma augusta*	Sterculiaceae
47.	*Araucaria cunninghamii*	Araucariaceae	48.	*Ardisia solanacea*	Myrsinaceae
49.	*Artemisia vulgaria*	Asteraceae	50.	*Artocarpus heterophyllus*	Moraceae
51.	*Asparagus racemosus*	Liliaceae	52.	*Bacopa monnieria*	Scrophulariaceae
53.	*Bambusa tulda*	Poaceae	54.	*Beaucamea recurvata*	Asparagaceae
55.	*Caloptropis gigantean*	Asclepiadaceae	56.	*Cajanas cajan*	Papilionaceae
57.	*Centella asiatica*	Apiaceae	58.	*Cipura paludosa*	Iridaceae
59.	*Cinnamomum tamala*	Lauraceae	60.	*Citrus aurantifolia*	Rutaceae
61.	*Citrus medica*	Rutaceae	62.	*Clerodendrum indicum*	Verbenaceae
63.	*Cycas circinalis*	Cycadaceae	64.	*Cycas pectinata*	Cycadaceae
65.	*Cymbopogon citrates*	Poaceae	66.	*Datura metel*	Solanaceae
67.	*Dioscorea floribunda*	Dioscoreaceae	68.	*Dracaena*	Liliaceae
69.	*Ephedra foliate*	Ephedraceae	70.	*Ficus elastic*	Moraceae
71.	*Geodorum densiflorum*	Orchidaceae	72.	*Hamelia patens*	Rubiaceae
73.	*Heritiera fomes*	Sterculiaceae	74.	*Hibiscus rosa-sinensis*	Malvaceae

Sl. No.	Name of Taxa	Family	Sl.No.	Name of Taxa	Family
75.	*Ixora coccinea*	Ribaceae	76.	*Jacquinia ruscifolia*	Theophrastaceae
77.	*Kleinhovia hospital*	Sterculiaceae	78.	*Madsuca longifolia var. latifolia syn. Madhuca indica*	Sapotaceae
79.	*Magnolia grandiflora*	Magnoliaceae	80.	*Gymnema sylvestre syn. Marsdenia sylvestris*	Asclepiadaceae
81.	*Marsilea minuta*	Marsileaceae	82.	*Mangifera indica*	Anacardiaceae
83.	*Michelia champaca*	Magnoliaceae	84.	*Moringa oleifera*	Moringaceae
85.	*Muehlenbekia platyclados*	Polygonaceae	86.	*Murraya paniculata*	Rutaceae
87.	*Ochna pumila*	Ochnaceae	88.	*Ochna serrulata*	Ochnaceae
89.	*Ocimum gratissimum*	Lamiaceae	90.	*Odina* sp.	Polygonaceae
91.	*Peltophorum pterocarpum*	Caesalpinaceae	92.	*Phyllanthus emblica*	Euphorbiaceae
93.	*Pinus roxburghii*	Pinaceae	94.	*Plumeria rubra syn. Plumeria acutifolia*	Apocynaceae
95.	*Polyalthia suberosa*	Annonaceae	96.	*Pterospermum acerifolium*	Sterculiaceae
97.	*Tradescantia spathacea syn. Rhoeo discolor*	Liliacae	98.	*Roystonia regia*	Arecaceae
99.	*Saraca asoca*	Caesalpinaceae	100.	*Setcreasea* sp.	Commelinaceae
101.	*Sterculia foetida*	Sterculiaceae	102.	*Swietenia mehogani*	Meliaceae
103.	*Cymbidium aloifolium*	Orchidaceae	104.	*Syzygium cumini*	Myrtaceae
105.	*Syzygium jambos*	Myrtaceae	106.	*Tabernaemontana divaricata syn. T. coronaria*	Apocyanaca
107.	*Terminalia arjuna*	Combretaceae	108.	*Thespesia populnea*	Malvaceae
109.	*Thunbergia* sp.	Acanthaceae	110.	*Thuja occidentalis*	Cupressaceae
111.	*Tylophora indica*	Asclepiadaceae	112.	*Vanilla planifolia*	Orchidaceae
113.	*Wrightia coccinea*	Apocynaceae	114.	*Zamia* sp.	Cycadaceae

***List prepared by Bidyut Biswas, P. Ganguli, I. Chaudhuri and Biswajit Roy.**

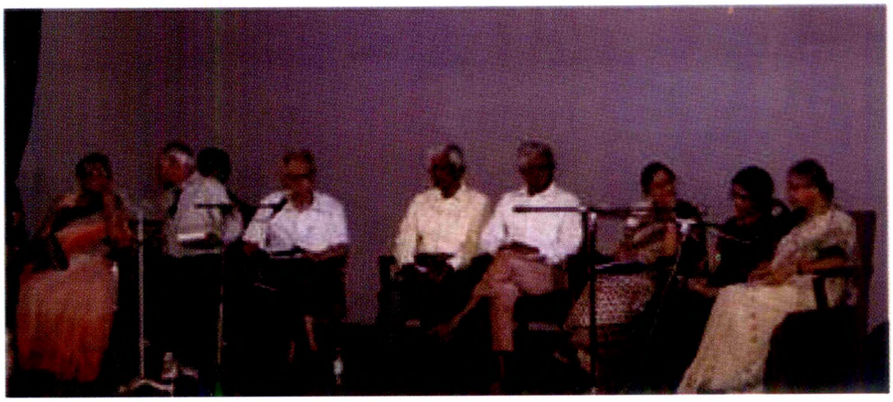
Centenary Celebration Closing
& 69th Annual Reunion
on March 15, 2015

Opening of 69th Reunion by Lighting Lamp

Release of History Book of Botany Department

Dignitaries on the Dias

Musical Event by Some Senior Alumni



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Thakurpukur, Kolkata-700 063
Phone-2497 6450, Mobile-9433273580

41. **Barun Kumar Roy**
507, G.T. Road, Mahesh, Sreerampore
Dist. Hooghly-712202

42 **Baruna Bhattacharyya** (1973),
Madhy Para, P.O. Rahara,
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Phone-2568 5533
Mobile-9830374912

43. **Bharati Mukhopadhyay** (1986)
181 Bidhan Sarani
Kolkata-700006
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Mobile-98302 36004
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44. **Bharati Nandi** (1966)
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Phone-2528 3005
Mobile-9830113479

45. **Bidisha Mallick** (1996)
485/493, Diamond Harbour Road,
Poraaswathatala, Kolkata-700063
Phone-(033) 2497 6746
Mobile-9433174416
bidishac2001@yahoo.co.in

46. **Bidyut Bhusan Chattopadhyay** (1980),
66B, Bagh Bazar Street,
Kolkata-700003
Phone-2555 6488, Mobile-9830113479

47. **Bidyut Kumar Biswas** (1971),
The Purbalaya Co-operative Housing
Society Ltd , 4.1, Bediadanga 1st Lane,
Block-7, Flat-44, Kolkata-39,
Phone-23438418 (R)

48. **Binod Kumar Pathak** (1985)
EC-112, Salt Lake,
Kolkata-700064, Phone-2358 1159

49. **Binoy Choubey** (1991)
27/1B, Nimu Goswami Lane,
Kolkata-700005
Phone-25308817

50. **Biswanath Chakrabarty**
(1976), Himalaya Kanya Abasan,
Phase I, Flat HIG-C-3/7,
Salugara, Sevoke Road,
Siliguri-734008,
Darjeeling
Phone-0353-2543583,
Mobile-9434715402

51. **Biswajit Ghosh** (1985)
54B, Maharaja Tagore Rd.
Kolkata-700031
Phone-2433-5622
Mobile-9432113696

52. **Biswajit Roy** (2006)
31(22/A) Kalianibas Main
Road (N), Nona Chandanpukur North 24
Pgs, Kolkata-700122
Mobile-9433516795

53. **Bratati De** (1978)
Flat-1C, 77/1K, R.K. Chatterjee Road,
Kolkata-700042
Phone-24428721/24411342
Mobile-9831120700

54. **Bulu Rani Basu** (1967)
16-A, Abhoy Sarkar Lane
Kolkata-700020
Phone-2454 6380

55. **Chandan Mukherjee** (1974)
B9/3, Kalindi Housing
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Phone-2522 5997
Mobile-9433431287

56. **Chhanda Bhattacharyya** (1981),
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(West), Pin Code-799004
Phone-(0381) 2510766
Mobile-9436125127

57. **Chinmoy Ranjan Das** (1954)
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58. **Chitra Basu** (Dey) (1963)
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Phone-2486 0838

59. **Chitra Bhattacharyya**
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74.7, Bacharam Chatterjee Road,
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Phone-24680176

60. **Chhabi Maity** (1973)
Block-24, Flat-8, Regent Park
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61. **Daliya Hom Chowdhury** (1987)
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Phone-2425 1135
Mobile-9831134543

62. **Debarati Das** (2001)
90A, Shyambazar Street
Kolkata-700005
Phone-2554 4559
Mobile-9830429062

63. **Debabrata Maity** (1998)
D-67, East Rajapur, P.O.
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64. **Debasri Chakrabarti** (1985)
58/1A, Suren Sarkar
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Phone-2363 1180

65. **Debrajan Das**(1990)
75/74A, S.N. Roy Road,
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Phone-2398 0816
Mobile-9831288740

66. **Devi Kundu** (1961)
20 White House Way,
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Phone-(0044)2083684302(O)

67. **Dipak Kumar Kar** (1979)
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Mobile-9831288740

68. **Dipak Kumar Nayak** (1974)
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69. **Dipan Adhikari** (1997)
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Mobile-9051588193

70. **Dipayan Chattopadhyay**
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Phone-03582 226999

71 **Dwijendra Narayan Guha Bakshi** (1954)
66 Prince Bakhtier Shah
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72. **Dilip De Sarkar** (1977)
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73. **Enakshi Ghosh** (2006)
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74 **Ferdous Begum** (1996)
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75 **Gargi Sengupta** (1995)
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76. **Gopa Ghosh** (1973)
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77 **Gopinath Hait** (1977)
Asha Kunja, H/E-5,
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78 **Gour Gopal Satpati** (2009)
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79. **Gunjan Biswas** (2006)
'Lekhashree' Uttarayan,
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Mobile-9831336353

80. **Gurupada Sarkar** (1974)
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Mobile-9331916570

81. **Gargi Dey Chaudhury** (1986)
13, Selimpore Road, Block-A
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Phone-2414 2808
Mobile-9831357140

82. **Ila Chaudhuri** (1965)
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83. **Indrani Bhattacharya**
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Mobile-9830059539

84. **Jayanti Mukherjee**
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E/2, Rajlaxmi, 88/1, R.K.
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85. **Joseph Jose**
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86. **Jayasri Lahiri** (1967)
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87. **Kalyan Kr. De** (1978)
P-68, Bosunagar, Gate No 3
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Dist. North 24 Pgs.
Kolkata-700129
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88. **Kalyan Kumar Mandi** (1964)
50/3D/21, Dharmatala
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89. **Kalyan Kundu** (1961)
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90. **Kanak Ranjan Samaddar**
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Nadia, Phone-2582 6587

91. **Kankana Sinha** (2005)
1/3 Prassanna Kumar
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92. **Karabi Datta** (1974)
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93. **Kashinath Ghosh** (1974)
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94. **Kaustav Bhattacharyya**
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Kolkata-700039
Mobile-9831634364

95. **Khageswar Chandra Das**
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12/9, Nayapatti Road
Kolkata-700055, Phone-2579 7864

96. **Kingsuk Das** (2001)
34, Talbagan East Road
P.O.- Nonachandan Pukur
Barrackpore, Pin-700122
Dist.-24 Parganas (N)
Phone-2592 1204
Mobile-9830790829

97 **Koushik Patra** (2006)
Joka Tram Dept., P.O.-
Joka, P.S - Thakurpukur
Kolkata-700104

98. **Krishna Chakraborty** (1971)
19/60, Mail Road
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99. **Krishna Chaudhury** (1999)
53/1/1, Naskar Para Road
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100. **Krishna Kumar Rastogi** (1980),
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101. **Krishnendu Acharya** (1992)
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102. **Kumud Ranjan Naskar** (1972)
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Mobile : 933138083

103. **Kunal Mukhopadhyay** (1985)
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104. **Kanailal Mitra** (1967)
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I.M.C. Mitra Lane, Konnagar
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105. **Krishna Sen** (1967)
14B, Dum Dum Road
Ritesh Apartment,
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Mobile-9433305676

106. **Lily Roy** (1975)
18, Chhaku Khansama
Lane, Kolkata-700007
Phone-9830298039

107. **Madan Mohan Bhattacharyya** (1967)
219, Shantipally, P O.-Kasba
Kolkata - 700042, Phone-23431219
Mobile-9433437237

108. **Madhuchhanda Mukhopadhyay**
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10-S, Dilwara, Maharshi
Karve Road, Mumbai-400021
Phone-(022) 2288 2134
Mobile-09820320603

109. **Madhumanjari Mandal**
(1992) Flat No.-A2/2,
Tribeni Housing Complex
434, S.K. Bose Sarani
Kolkata-700030
Phone-2522 2322
Mobile-9830075960

110. **Madhumita J. Mukhopadhyay** (1983)
Apt. No 5D, 14-A, Gopal
Banerjee Lane, Kolkata
Phone-22882134
Mobile-9830320603

111. **Madhusudan Mondal**
Andul Dakshinpara
Andul Mouri, Howrah
Pin Code-711302, Phone-2669 1986

112. **Mahuya Banerjee** (1970)
18/19, Ballygunge Place
(East), Kolkata-700019
Phone-2440 4582/3129
Mobile-9830094029

113 **Mala Neogy** (1989)
54/10/1, Kashi Nath Dutta Road,
Kolkata-700036
Phone-2557 5947

114. **Malay Chakravorty** (1967)
16, Kumarpara Road,
Rajpur, Kolkata-700149
Phone-2477 9092

115. **Malyasri Bhattacharya**
(1975) 122A, Ananda
Palit Road, Kolkata-700014
Mobile-9831945565

116. **Manas Ranjan Mazumder**
(1995) Vasundhara
Nivas, Flat No.3/A,
P-27, Motijhil Avenue,
Kolkata-700074

117. **Manisha Mukherjee** (1977)
85/11 Tantipara Lane
Howrah-711104
Phone-2667-3926

118. **Manishi Nath Das** (1965)
B4/8, Kalandi Housing
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Mobile-9830643137

119. **Manjira Das** (2000)
Dept. of Botany, C.U.
Kolkata-700019
Mobile-9831364527

120 **Manju Banerjee** (1960)
58A, N.C. Choudhury Road, Arspan Apt.,
Block-Atma, Flat No.-205, Kolkata-42
Phone-2415 1788

121. **Milan Kumar Bhattacharjee** (1977)
22, Adkinson Close Issuacce Canberra,
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vpmilan@optusnet.com.au

122. **Md. Shahid Khan** (2005)
30, Bariruddin Munshi
Lane, Howrah-711101
Mobile-9883255416

123. **Milan Kumar Maity** (1964)
Green Park, Baksara, Howrah-711110
Phone-2658 9471
Mobile-9433626682

124. **Mili Chakrabarti** (1975)
19/60, Mall Road
Kolkata-700080
Phone-2559 2230
Mobile-9433268519

125. **Minati Banik** (1959)
6/6, Naren Sarkar Road
Barisha Post Barisha
Kolkata-700008
Phone-24475486

126. **Mira Bhowmick** (1958)
5/24, Viveknagar, Kolkata-700075
Phone-2418 4118, Mobile-9433679223

127. **Molly Datta** (1982)
77/1 Ibrahimpur Road
Kolkata-700 032, Phone-2412 5313
Mobile-9831912713

128. **Monalisa Roy** (2004)
DL-194, Sector-II, Salt Lake City,
Kolkata-700091
Phone-2447 5486
Mobile-9830699928

129. **Maumita Bandopadhyay**
(1998), LX, 20603 Utsa Luxury, Block AG/
1, New Town, Kolkata-700156
Phone-24241135
Mobile-9830324204

130. **Mousumi Das** (1985)
59, Lake Road, Sirsa, Block-I, Flat 8B,
Kolkata-700029, Phone-2464 8306
Mobile-9830717305

131. **Mousumi Debnath** (1993)
D-22, Staff Colony MNIT,
Jaipur-302017, Mobile-9414607377

132. **Mousumi Poddar Sarkar**
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Phone-2650 2864
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133. **Mousumi Roy** (1994)
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Mobile-9830733421

134. **Mun Mun Dey** (1999)
Mobile-9830431719
E-mail:dey.munmun@gmail.com

135. **Mantu De** (1974)
21/2, Lake 4/3rd Road
Santoshpur, Flat No 5
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136. **Nabarun Ghosh** (1987)
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137. **Nanda Dulal Paria** (1972)
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Kolkata-700006, Phone-2555 1222,
Mobile-9433096969

138. **Nandan Bhattacharya** (1981),
Vill. + P.O. Haria,
Pin Code-721430,
Dist. Purba Mednipur, W.B.
Phone-03224 2529000, Ext.234
Mobile-9436125127

139. **Nandini Chakrabarti**
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140. **Nilofer Khatoon** (2006)
21/A, Nasiruddin Road
3rd Floor, Flat No 3C
Kolkata-700 017
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Mobile-9433241975

141. **Nimai Chandra Barui** (1972),
19R/7, Dum Dum Road, Kolkata-700030
Phone-2558 4195
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142. **Nirmalendu Samajpati**
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P-3 Shashi Bhusan Dey
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Mobile-9874183007

143. **Nirupam Barman** (2009)
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144. **Pabitra Chitta Nandi** (1959)
Shibtala Lakshrni Narayan Road, Rabindra
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Phone-2566-0922

145. **Panchanan Maji** (1976)
172/E Ramakrishna Road. New Barrackpore,
Kolkata-700131
Phone-25373170

146. **Papiya Saha** (2002)
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P.O.-Natagarh, Dist -24 Parganas (N),
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Phone-2568 5496
Mobile-9831054164

147. **Paramita Chaudhuri** (2001)
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Kankurgachi, Kolkata-700054
Phone-94331 36204

148. **Parasuram Kamilya** (1987)
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Phone-25681752
Mobile-9831683998

149. **Parbati Samajpati** (1968)
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150. **Parimal Nag** (1973)
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Mobile-9433262806

151. **Paritosh Kr. Ghosh** (1978)
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Mobile-9932011697

152. **Partha Roy** (1980)
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Mobile-9432113696

153. **Parthadeb Ghosh** (1972)
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154. **Pijush Roy** (1963)
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Phone-2137 2889

155. **Prabal Kumar Naskar** (1986)
South Thanamakhua,
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156. **Prabir Basu Chaudhuri** (1973)
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Kolkata-700075
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Mobile-9433097768

157. **Prabir Kumar Ganguly** (1970)
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Mobile-9830574346

158. **Prabir Kumar Saha** (1971)
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159. **Pranab Kr. Bandopadhyay**
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Mobile-9830445880

160. **Pranati Mukherjee** (1974)
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161. **Prantosh Roy** (1973)
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162. **Prasanta Kumar Bhattacharyya** (1969)
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163. **Prasanta Kumar Mukherjee** (1964)
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164. **Prasanta Kumar Sircar**
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165. **Prasanta Kumar Sen**
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Mobile-9830403473

166. **Pratima Nag** (1973)
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167. **Pratip Kumar Palit** (1970)
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Mobile : 9830882960

168. **Prem Kumar Gajra** (1974)
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Mobile-9830025142

169. **Prasanta Dey** (1999)
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170. **Pulak Mukhopadhyay**
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171. **Prajna Maitra** (1973)
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172. **Rabindra Krishna Mukherjee** (1955)
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173. **Rajat Kanti Chaudhuri** (1960)
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174. **Rajib Bandopadhyay** (2007)
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Mobile-09430378406

175. **Raikamal Pal** (Sarkar) (2003)
Sarashi Apartment, Flat No. 11 and
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Phone-244848334
Mobile-9830508540/9830039831

176. **Rajyasri Ghosh** (1998)
1/5, Purbachal Canal
South Road, Kolkata-700078
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Mobile-9433985015

177 **Ram Prasad Mukhopadhyay** (1984)
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178. **Ramkanta Chakrabarti**
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179. **Ranajit Mallick** (1959)
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180. **Ratna Banerjee** (1970)
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181. **Ratna Chatterjee**
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182. **Rina Debnath** (1964)
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Mobile-98360 80293

183. **Rita Kundu** (nee Sen) (1987)
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184. **Rita Chaudhury Datta** (1980)
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Kolkata-90
Phone- 2531 6796

185. **Rituparna Kundu Chaudhuri** (2001)
S.S.S. Housing Complex
35, Jessor Road,
Phone-9830403057

186 **Roma Chakraborty**
(1960), 'Prasanti', 12B, Gopal
Chandra Mukherjee
Road, Kolkata-700002
Phone-2557 1605

187. **Rothin Kumar Chakraverty** (1960)
'Prasanti', 12B Gopal
Chandra Mukherjee
Road, Kolkata-700002
Phone-2557 1605

188. **Rudrajit Chakrabarty** (1997), 171/N,
Mondal Para Road, Block-C,
Jayasree Park, Behala,
Kolkata-700034
Phone-24068282/8139
Mobile-9830020548, rudrajitc@hotmail.com

189. **Ruma Pal** (1980)
Flat-D2, 38, R.K. Chatterjee Road,
Kolkata-700042
Phone-2441 2513
Mobile-9433116320

190. **Rupa Acharya** (1992)
P-7B, Brojomohan
Mandal Road, Santoshpur
Kolkata-700075

191. **Rajarshi Roy** (1998)
4 Satyen Roy Road, Behala
Kolkata-700 034
Phone-033 2397 2084
Mobile-9433101146
rajashiroy2011@gmail.com

192 **Rabindranath Saha** (1990)
C/O, Ajanta Furniture
Tribeni Daulet Bazar,
P.O. Tribeni, Dist. Hooghly,
Pin-712503
Mobile-9434320430
rabranathsh@gmail com

193. **Sabita Bhattacharya** (1971)
Salt Lake FD-279
(Ground Floor), Pin-700106
Phone-23031132

194. **Sabita Sen** (1955)
36, Prince Gulam Md. Shah Road,
Golf Garden,
"Chhayaneer Apartment"
Kolkata-700033
Phone-2414 2950

195. **Saguna Dutta Gupta**
(1970) 112, Jodhpur Park,
Kolkata-700068
Phone-2430 4377 (O)
/2473 1120 (R)
Mobile-9831133112

196. **Salil Kumar Basak** (1967)
26B, Mandal Street
Kolkata-700006
Mobile-94344815505

197. **Salil Kumar Chadhuri**
(1958) Baisakhi, R6/2,2
Deodar Rahaman Road
Kolkata-700033, Phone-2471-3361

198 **Samit Ray** (1980)
P-31 CIT Road, Scheme
11M, P.O. Beleghata,
Kolkata
Mobile-9434036628

199. **Samita Banerjee** (1980)
4/1, Kalachand Sanyal Lane
Kolkata-700 004, Mobile-9433206617

200. **Samir Kumar Mondal**
(1969), 859/6 Jasore Road,
Swami, Vivekananda Park
Kolkata-700055
Mobile-9433342734

201. **Sandip Mukhopadhyay**
(1977) Apt. No.-5D, 14A
Gopal Banerjee Lane,
Kolkata-700026
Phone-2463 1295
Mobile-9831225631/9433430351

202. **Sandip Priyodarshi** (1985)
Aradhana Housing
Society, Flat No.80/20, MIDC,
G-Block, Shanu , Nagar,
Pune 411019
Mobile-09329773057

203. **Sanghamitra Sanyal** (2000)
Taki Govt. College, Dept of Botany,
North 24 Pgs., Mobile-9433847706

204. **Sanjay Roy Chowdhury** (1993)
'Sarabari' Barisha, 67 Diamond Harbour
Road, Sakher Bazar,
Kolkata-700008, Phone-2446 7925
Mobile-9831080176
sanjoy.roychowdhury@in.ey.com

205. **Sankar Kumar Sahoo** (1976),
Vill.-Krishnagar,
P.O.- Dorokrishnanagar,
Purba Mednipur
- Phone-03224 281331 (R)

206. **Santanu Paul** (1995)
Mani Manjusha Apartment, Flat No.2,
23/B, Bade Raipur Road, Jadavpur,
Kolkata-700032, Mobile-9874192648

207. **Santinath Sarkar** (1971)
10, Rishi Bankim Chandra Road,
Kolkata – 700028
Phone-24517782, Mobile : 9830008922
snsarkar07@gmail.com

208. **Saswati Biswas** (1974)
2A, Swami Vivekananda
Road, Bye Lane, West
Rajapur, Kolkata-700032
Phone-2425 8816

209. **Shakuntala Bhaduri** (1978)
102/1, Raja Rammohan
Sarani, Kolkata-700009

210. **Shampa Bhattacharya** (1988)
10, Star Lane, Kolkata-700006
Phone-25551639, Mobile-9433001677

211. **Shampriya Chowdhury**
(1988), 32/1D Gariahat Road (S),
Kolkata-700031, Phone-2472-6932
Mobile-9831015817

212. **Shakuntala Nandi** (1962)
BD 355, Sector 1, Salt
Lake City, Kolkata-700064
Phone-2334-9323

213. **Shibani Ray Chaudhury** (1972), 197/2,
Rastraguru Avenue, Kolkata-700028
Phone-25517139, Mobile-9831117429

214. **Shikul Bhattacharji** (1964)
AK 185 Sector II, Salt Lake
Kolkata-700 091
Phone-2358 5059
Mobile-9804461814

215. **Shyamal Kumar Chakraborty** (1978)
9/3, Chanditala Lane, Kol-40
Phone-2411 4158 (O) / 24732223 (R)
Mobile-9433441436

216. **Shyama Sanyal** (1973)
Flat No.-11, Manjula
Towers, 32 Hazra Road
Kolkata-700029
Phone-24769733
sanyal2006@gmail.com

217. **Sital Prasad Chattopadhyay** (1985)
6/4 Seal's Garden Lane
Kolkata-700002, Phone-2546 3768
Mobile-9433460546

218. **Soma Banerjee** (1997)
112/B Ananda Palit Road
Kolkata-700014
Phone-2244 6479
Mobile-9831064344
somaban@rediffmail.com

219. **Sona Sen** (1966)
1B-149, Sector III,
Salt Lake, Kolkata-700106
Phone-2335 1997

220. **Soumitra Sen** (1984)
Via Delia Stazione D1
Pavona 203 00040
Pavona/Albano Laziab DM, Italy
Phone-00 090671302560

221. **Sreelekha De Bera** (1986)
59, Prince Golam Hossain Shah Road,
Kolkata-700032
Phone-24723805
Mobile-9831200553

222. **Sreetama Bhadra** (2008)
Flat-3/3C Vishal Apt.
2/2 Santosh Roy Road
Sakherbazar, Kolkata-700008
Phone- 24479241

223. **Sreya Dutta** (2005)
58H Barick Para Road,
P.O. Behala, Kolkata-700034
Mobile-9433554907

224. **Subhas Chandra Santra**
(1972), 1/1B, Nalapukur
Lane, Behala,
Kolkata-700034
Phone-(033) 2403 1396

225. **Suchitra Banerjee** (1979)
20/15 Indira Nagar,
Lucknow 226016, U.P.
Phone-05222351023
Mobile-09450911291

226. **Sudipta Chattopadhyay** (1992),
203/47 Narkel Bagan, Chinsurah, Hooghly
Pin-712201
Mobile-9434662456

227. **Subhasis Saha** (1989)
2/12A, A.D.C. Park
Kolkata-700086
Phone-24250025
Mobile-9433331919

228. **Subhra Mukhopadhyay**
(Talai) (1994) Uttara Apar,
45/6, Seth Bagan Road, Flat No.6
2nd Floor, Dum Dum Kol-30
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talaisubhra@yahoo.co.in

229. **Subimal Mahapatra**
(1964) Ruchira Residency Tower-8,
Flat-9/6, E.M. Bypass,
Kalitala Main Road
Kolkata-700078
Phone-24844330
Mobile-9830683005

230. **Subimal Roy** (1960)
Prantik, Flat-C1, Vivekananda Road,
Kolkata-700075, Phone-3295 5882
Mobile-9830161648

231. **Subir Bera** (1986)
59, Prince Golam Hossain Shah Road,
Kolkata-700032, Phone-24723805
Mobile-9831750553

232. **Subir Sen** (1966)
1B-149, Sector 1H, Salt
Lake, Kolkata-700016
Phone-2355 1997
Mobile-94333 26509

233. **Subhendu Mukherji** (1958)
17, Dr. Katrick Bose
Street, Kolkata-700009
Mobile-9831147536

234. **Sudarsan Maji** (1972)
AT & P.O.-Meceda,
Dist.-East Medinipur
Pin Code-721137
Phone-(953228) 231636

235. **Sudhendu Mandal**
Basusree, Simantapally,
Shantiniketan, Pin Code-
731235, Phone-(03463)
264607, Mobile-9433162374

224. **Sudip Kumar Sinha** (2000)
91/2, B.C. Road, Behala,
Kolkata-700034
Mobile-9830585797

236. **Sugata Bhattacharya** (1996)
169/A, Anandmath, Ichapur,
P.O. Ichapur Nawabgang,
Dist.- 24 Paragans (N)
Kolkata-700125
Phone-25408873(R)/
22871381/82(O)
Mobile-9830024524
subhatt2003@yahoo.co.in

237. **Sukhen Roy Chowdhury**
(1983) Vill.-Goalbari
P.O. Chougachha, P.S.
Chakdaha, Dist.-Nadia
Pin Code-741222 (W.B.)
Phone-(03482) 259350
Mobile-9434640113

238. **Suman Datta** (1999)
5/1, Ambika Mukherjee
Road, Belghoria
Kolkata-700056
Mobile-98303 69368

239. **Sumita Ghosh** (1979)
Flat-FG-1, Kasturi
Housing, 77A, Bade Rajpur Road,
Kolkata-700032
Mobile-9433014938

240. **Sumita Jha** (1975)
72, Rahim Ostagor Road
Kolkata-700045
Phone-2241 1960, Ext.202

241. **Sumitra Sen** (1955)
12/1, Swinhoe Street,
Flat B-5, Kolkata-700019
Phone-2440 7491

242. **Sumona Mukhrerjee** (1978)
18, Nandan Road
Kolkata-700025
Phone-2455 7650
Mobile-98305 13623

243. **Sunanda Ray** (1986)
49A/11 Biren Roy Road (W)
P.O. Barisha, Kolkata-700 008
Phone-24474638
Mobile-9830416922

244. **Suparna Pal** (Kar Chaudhury) (2003)
10/1/1P, Atal Sur Road
Kolkata-700015
Phone-24414852
Mobile-9830436204

245. **Supatra Sen** (1992)
2, Gopal Ghosh Lane
Kidderpore, Kolkata-700023
Phone-(033) 2449 7342
Mobile-9830295114

246. **Supriti Rani Datta** (1978)
5, Anandapuri Middle
Road, P.O. Nonachandan Pukur,
Dist.-24 Pgs
(North), Pin-700122
Phone-25945128/25921600

247. **Surekha Kundu** (1993)
7A, Rammohan Roy
Road, Kolkata-700009
Mobile-9874286840

248. **Susanta Kumar Ghosh**
(1977), 27/5 Andul Road,
Howrah-711109
Mobile-9836241989

249. **Sushovan Bera** (1988)
Flat No.-C3, Swasti Apt.,
H/15A, Aswaninagar,
Pubali, Baguiatii,
Kolkata-700059
Mobile-9830288130

250. **Sutapa Kumar** (Rai) (1986)
Flat 9F, Tower II, Diamond
City West, 18 HO Chi Minh Sarani,
Kolkata-700 061
Phone-24983369
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sutapa.kumar.rai@gmail.com

251. **Swapan Bhattacharya** (1977) 10/49,
Netaji Nagar,
Kolkata-700040
Phone-24716860
Mobile-9830116026

252. **Swapan Kumar Datta** (1977)
Bengal Ambuja,Udita-020302,
1052/1, Survey Park
Kolkata-700075
Phone-2476 4419
Mobile-9830668907
spwndatta@yahoo.com

253. **Swapna Das** (1976)
54, Hari Ghosh Street,
Student's Residence,
Kolkata-700006
Phone-2543 4736
Mobile-9830579183
swapna_scottish@rediffmail.com

254. **Swati Maitra** (Sen) (1988)
"Arpan Apartment", Flat
B/3/3, Teghoria, Kol-700059
Phone-2570 4732
Mobile-9830403473

255. **Swati Sen Mandi** (1970)
50/3D/21, Dharmatala
Road, Kolkata-700042
Phone-2343 7769
Mobile-9830688067

256. **Syamsanatan Santra** (1997)
C/O Maya Simlia, Rahara,
Regent Park, Kolkata-700118
Mobile-9831331831

257. **Sharmila De Sarkar** (1985)
2, Central Park (East),
Indralok Apartment,
Kolkata-700 032
Phone-99300704385

258 **Srabani Paul** (2011)
Purba Rabindra Pally
P.O. Nonachandanpukur
Barrackpore, North 24 Pgs.
Pin Cole-700122
Phone-033 2545-2713
Mobile-9804134298
E-mail· srabanip@gmail.com

259. **Subhra Chakraborty** (1989)
C9/9428 DDA Flat Basantkunj,
New Delhi-110070
Phone-9971923777
subhrac@hotmail com

260. **Sumana Bhattacharyya** (1990) RC1/2,
Raghunathpur
Debolina Apartment,
Flat No 302. Kolkata -59
Phone-9433129600
sumana36@rediffmail.com

261. **Swapna Banerjee** (1986)
Flat No. 6, Parul Apart
6/3 Dr M N Saha Road
Kolkata-700 004
Mobile-9830305624
swapna berjee98@gmail.com

262 **Sk. Khaliluddin** (1990)
Vill+P O Kalindi, P S Rammagar,
Dist.- Purba Medinipur,
W B. Pin-721401
Mobile-9851947180

263 **Sarbani Sarangi** (1990)
Krishnanagar Baluchari Abasan,
Kontai. Purba Medinipur. Pin-712401
Mobile-9434987408
sarangisarbani63@gmail com

264. **Subir Kumar Panja** (1990)
Debola Bhaban, Ramrajatala Station
Road, Howrah-711104
Phone-9433360874
E-mail subir2k12@gmail com

265. **Sumita Kar** (Ghosh) (1950)
Flat-3A, Kinjal Apartment
333L Jessore Road,
Kolkata-700 089
Phone-2522 4612
Mobile-9830520680
E-mail.sumitakujl@gmail.com

266. **Satyabrata Ghosh** (1976)
128/1, Nagendranath Road,
Kolkata-700 028, Mobile-9433868417
E-mail.sbghosh2010@msn.com

267 **Sudipta Roy** (2001)
17/1 Kavi Sukanta Lane Santoshpur,
Kolkata-700 075, Mobile-9433065760

268 **Suchita Sinha** (1989)
162/B/405 Lake Gardens,
Kolkata-700 045
Phone-2422 8768, Mobile-9433122420
suchital@yahoo.co.in

269 **Tandra Das** (1981)
1, Uria Para Lane,
Entally, Kolkata-700014
Phone-2284 1630, Mobile-9830440789

270. **Tapan Kumar Adhya**
(1972) Flat No.-6, 58-H, Bankpara Road
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Phone-(0671) 2367777
Mobile-9337251340

271. **Tapan Kumar Maitra**
(1980) 20, S.P Mukherjee Road,
P.O Nabagram, Dist.-Hooghly (W.B.),
Pin Code-712246
Phone-(033) 26734584/0595

272. **Tapan Rakshit** (1990)
Vill.-Chototajpur
P.O. Bagampur,, Dist.- Hooghly
Pin Code-712306, Phone-26781689
Mobile-9903236909
sutapa kuma rai@gmail com

273. **Tapas Kumar Sarkar** (1992)
15, Vivekananda Road
P.O. Bengal Enamel, Dist.-24 Parganas (N)
Pin Code-743122

274. **Tapati Sengupta** (1969)
160, Kanungo Park,
Garia, Kolkata-700084
Phone-2430 1658, Mobile-9831154493

275. **Timir Baran Jha** (1975)
72, Rahim Ostagar Road, Kolkata-700045
Mobile-9432184468

276. **Tridib Kumar Chatterjee**
(1980) 1/1 Brindaban Mallick Lane,
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Mobile-98300 86653
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277. **Triveni Krishnan** (1979)
Theen Bari Tyangra Baguiti,
Hatiara Road, Kol-700059
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278 **Tuntun Prasad Singh**
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279 **Udayan Sengupta** (1980)
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280. **Upendra Chandra Bhattacharyya** (1955)
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281. **Usha Chakraborty** (Menon) (1976)
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283. **Usha Keshan** (1988)
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284 **Veena Hingrah** (1993)
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